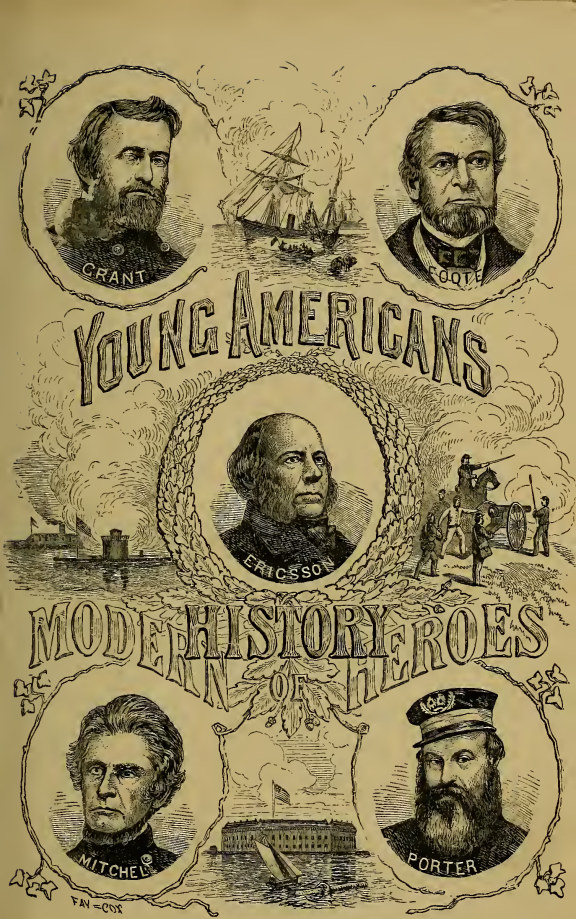
LIBRARY OF CONGRESS
1800

455
2321

The Dictator in a Storm, (See p. 229.)


GRANT
FOOTE
YOUNG AMERICANS
ERICSSON
MODERN HISTORY OF HEROES
MITCHEL
PORTER

THE

MINER BOY AND HIS MONITOR;

OR,

THE CAREER AND ACHIEVEMENTS

OF

JOHN ERICSSON

THE ENGINEER

BY

REV. P. C. HEADLEY,

AUTHOR OF "THE HERO BOY," "JOSEPHINE," "WOMEN OF THE BIBLE," ETC.

NEW YORK:
WILLIAM H. APPLETON, 92 GRAND STREET.
1865.

T40
.E8 A5

7.4289

Entered, according to Act of Congress, in the year 1864, by
WM. H. APPLETON,
In the Clerk's Office of the District Court of the United States for the Southern District of New York.

TO

THE COUSINS,

T. W. H., AND I. H. B. H.,

THIS

STORY OF A BLAMELESS BOYHOOD,

AND A NOBLY USEFUL MANHOOD

WITH THE HOPE THAT IT

MAY ENCOURAGE THEM AND MANY OTHER

YOUNG HEARTS IN THEIR LIFE WORK,

IS INSCRIBED

BY

THE AUTHOR.

PREFACE.

The authentic biography given in this volume possesses unusual interest, both in regard to the distinguished subject of it, and the naval work of the North in the great rebellion. Without *him*, none can tell what would have been the condition of the civil conflict now. Descriptions of scenery, and incidents, with historical facts, have been introduced to lend interest and give clearness to the narrative.

The sources of information were furnished by Captain Ericsson in part. Mrs. Bunbury's "Travels in Sweden," an old history of the kingdom, and Abbott's "History of the Rebellion," were valuable works of reference.

The career of a remarkable man, whose unri-

valled success in his department of brilliant invention, was due mainly to intense and persevering study, whose habits of sobriety and industry were formed in boyhood, is worthy of permanent record.

It may be objected that failure has attended some of Captain Ericsson's expensive experiments upon his inventions. It would be strange, indeed, if none of these, unequalled in number in the history of the world, as the work of a single genius, should fail of realizing all that the inventor hoped for, or even yet may result from them by improvement. Large and small, in all they amount to *several thousands;* and every ocean, sea, and river of the civilized world, bear on their tides the creations of his skill.

Not only so, but the improvements which have been made by engineers and mechanics, and their inventions, suggested by Captain Ericsson's manifold contributions to science, are numerous. The great influence of his genius in such results cannot be estimated. The indebtedness of the world to his unwearied activity in this general impulse given to its progress, lends peculiar interest to his name.

It has been a pleasing task to collect, as far as

possible, the records of such a life, and present them to our American youth.

The pages in the last chapters, not directly connected with the personal history of Captain Ericsson, are added to lend interest to the grand field of his inventions, and to give place, in part at least, hereafter, to facts which will accumulate in the future of his eventful life.

May the young reader, whether native-born American or adopted citizen, be encouraged by it to make his life and memory a blessing to the race through honorable toil; and exert an influence while living, and when dead, pure and hallowed on those that labor with and after him, to elevate and save mankind.

CONTENTS.

CHAPTER I.

PAGE

The Victories of Peace—A rare History—Sweden—Its Early History—National Religion—Scenery—Curious Customs—Summer and Winter—Old People—The birth-place of Captain Ericsson—His earliest Exhibitions of Genius—Jule-Afton, ... 13

CHAPTER II.

The Boy-Mechanic—The Bride's Reception—Count Platten—His Ship Canal—The interview with Bernadotte—The Boy—Cadet—Engineer—Lieutenant, ... 32

CHAPTER III.

The King's Surveyor—The young Lieutenant's Examination—The Appointment—Romantic Service—Other Labors—Fulton and Ericsson—The Flame Engine—The Wooden Railroad—The Locomotive—The Exciting Race, ... 45

CHAPTER IV.

Disappointment—Not Discouraged—The Invention doing good—The Steam Fire-Engine—A Fire—Another Conflagration—The Gold Medal—Various Inventions—Ships—Steamers, ... 56

CHAPTER V.

PAGE

The New Wonder—Birds the Inventor's Instructors—The Miniature Ship and Sea—The Noiseless Triumph, ... 64

CHAPTER VI.

What is a Propeller?—Building a Ship—The next Toy of genius—The "Flying Devil"—Unwise Great Men—The Excursion—The Disappointment, ... 71

CHAPTER VII.

The Sublimely Confident Spirit—The Letter—The Result—The Mystery—Its Solution—The fresh display of Wisdom by the Admiralty—The Engineering Corps—The Swede and his American Friends, . . . 84

CHAPTER VIII.

Captain Stockton and the Naval Department of the United States—The new War-Vessel—The Privateer in New York Bay—The Race—The marvels of the Victor, ... 91

CHAPTER IX.

What Captain Stockton says of the Ship—The Mysterious Warrior—The Peaceful Work of the Propeller—What it is doing now, ... 100

CHAPTER X.

The Congressional Excursion on board the Princeton—The Captain and his Ship—Coronation Dinner—The Second Excursion—The Terrible Accident—The Cause of it, ... 107

CHAPTER XI.

A new Field of Invention—The Wakeful and Working Genius taught afresh by the Divine Law in Nature—The Caloric Engine—The Wise Men of England again—The Present and Future of Motive Powers—The Propeller is a success! 116

CHAPTER XII.

PAGE

The Inventor's Inventions—He is sure of Success with his Caloric Engine—The Improvements—The Brilliant Achievements in America—The Trial-trip—The Engine a Worker Still—Its Future, ... 127

CHAPTER XIII.

The Rebellion—Revolutions in Sweden—Outbreaks in the United States—Our Army and Navy—Captain Ericsson when the Civil War opened, . 133

CHAPTER XIV.

The "Merchant Prince"—His Interview with Captain Ericsson—The Inventor and the Naval Department—The Mysterious Box—On the way to Washington—Its fortunes there, ... 158

CHAPTER XV.

The Great Decision—Ratified by Congress—The Contract—Its strictness alarms the Money Kings—The Monitor is begun—The Builders and its Building—The Iron-works—The Strange Craft completed, . . . 165

CHAPTER XVI.

What Visitors said of the Monitor—The Launch—A Memorable Day—The Completed Work—The Vessel manned and at Sea—The Voyage—The Naval Position—The Crisis, ... 179

CHAPTER XVII.

The Merrimac leaves her Moorings—The Jamestown and Yorktown—The Naval Raid—The Fearful Struggle—Undying Heroism—The Ocean Scene of Destruction—The Closing Day, ... 186

CHAPTER XVIII.

The Monitor's Voyage—The Night Glimpse of Her arrival by the Anxious Garrison—The Impressions of an Eye-witness—The Morning Scenes—The Awful Interest felt in the Battery—The Wonderful Providence—The Sabbath—The Combat, ... 205

CHAPTER XIX.

PAGE

A Visit to the Dictator—First Impressions—The Leviathan in repose—The Turret: how it was moved from the Iron Works—The Machinery—The Officers' Quarters—The fighting qualities of the Dictator—Her Equipment and appearance at Sea, ... 225

CHAPTER XX.

The Propeller in the Navy—The interesting variety of Names—The Pay of Officers and Men—The Stromboli—The new Cassabianca, . . . 243

CHAPTER XXI.

Our Knowledge of the Sea—Curious Traditions—The "World of Waters"—Robert Fulton and John Ericsson—The Future—Great Battles—The Mother's Lament, ... 265

CHAPTER I.

The Victories of Peace—A rare History—Sweden—Its Early History—National Religion—Scenery—Curious Customs—Summer and Winter—Old People—The birth-place of Captain Ericsson—His earliest Exhibitions of Genius—Jule-Afton.

MY young reader, you have heard the truthful words, "peace has her triumphs no less renowned than war." They are quiet, like the work of God continually; but no less sublime than the victories of a just cause on the crimson field of battle. In the life of Captain John Ericsson you will have a very wonderful illustration of life's noiseless conflicts and conquests. History can furnish nothing that surpasses it. All lands and waters have the splendid memorials of triumphant invention, overcoming or using the forces of nature in the world's progress. But before we follow the conqueror—the miner-boy from his mountain seclusion to the great metropolis of the Western Continent—I will take you to his native land, and give you a glimpse of its scenes and scenery. Sweden! what can

you tell me of this land of the cold North—the birth-place of many distinguished men—the early home of John Ericsson?

Who reigned over the Hebrew nation when Christ was born?

"The Romans," you answer. And they called that country Scandinavia, then a pagan realm like their own. The people gave it the name of Swerige, or Sweriket. Before the reign of Odin, the mighty conqueror of northern Europe, it was known as Jothland, and the inhabitants called Jothar. From those words came Gothland and Goths. In the ancient time singular titles were often given to the kings, to indicate some peculiar fact in their history. About eight hundred years after the Saviour's advent, Olaf, the *Woodcutter*, was driven from the throne. In the year 830, St. Ascanius, a zealous monk, visited Sweden and preached the Roman Catholic faith in the presence of the king, Biörn, of the Hill. He made some converts from paganism; but not until the year 1000, in the reign of Olaf, *Kot-Konung*, that is, the lap-king, because he received royal homage while an infant, was heathenism fairly supplanted by Christianity, itself already corrupt in form. Olaf was baptized, and made the new religion that of the State. Still idolatry of the past ages continued to linger among the wild valleys of Sweden. For three long centuries after, the Goths and Swedes quarrelled for the supremacy. But they became

gradually more united, and in the latter part of the twelfth century were prosperous under Magnus Sodulas, or *Barnlock*, receiving the last title because he guarded so well the people's *granaries*.

Before the Catholic faith prevailed, during the long ages, the people had a very singular way of crowning their kings. When a new prince was to take the vacant throne, he must come before it, and looking on the waiting seat of royalty, go away and perform some deed of valor, then drink his libation from a skull, which was the evidence of his heroism. This entitled him to the sceptre. The Roman pontiffs introduced the splendid ceremony of coronation.

After bloody revolutions, Gustavus Ericsson became the conqueror of the kingdom, and the inhabitants offered him the crown. This was at the commencement of the fifteenth century. You know at that time Martin Luther was making pope and cardinals tremble before his eloquent preaching of the truth. The great Reformation was sweeping like a flood over the plains, around the papal altars. The king made inquiry into the new faith, and determined to let it come into Sweden just as Luther proclaimed it. The church already formed, and called after the converted and wonderful monk, Lutheran, had its own peculiar forms. It was a little Catholic still in ritual service, for to *reform* the old system was all he hoped to do.

In 1593 the Lutheran church was declared, by the Synod of Upsal, to be the State religion. You know what this is? The church is joined to, and becomes dependent on, the State. The royal support is given to it. It will be better understood when I tell you what the laws of Sweden required. A subject was banished if he changed his religion. The same penalty was inflicted upon any person who introduced a new system of belief. Strangers could not worship in any other forms but the Lutheran in public. It is true that foreign ministers and their families were let alone, because it would not do to touch the officers of other royal courts. The expansive mind of Ericsson, as you will learn, preferred the larger liberty of this Republic, although great changes have occurred in the progress of Christianity in his native land. Whenever Christianity is made to lean on the civil arm for support, receiving gifts and honor from the State, it becomes formal. No nation can be truly prosperous without the power of the church, the influence of Christian people and worship. But the divine institution should never be married to the State. We glory in the separate existence of the two in our country. Like Revolutionary France, so often rolling her garments in her own blood, we shall be wrecked without a living Protestant church; still it is, and must be, independent of the patronage of the Government. The Lutheran worship in Sweden is too lifeless, and the spiritual good of the people is neglect-

ed in the routine of prescribed public duties. The clergy are, many of them, lovers of money and ease.

Norway was united to Sweden in 1814, and in a strange way. Monarchs are usually royal *robbers* When England and Russia entered the coalition against Napoleon, the autocrat agreed to give Sweden Norway, if she would join them. After an indignant protest, and some fighting, the *gift* was secured.

The population of the kingdom is divided into four classes: the nobility numbering 11,000; the state clergy, of whom there are 15,000; the burghers, or mechanics and others who hold property to a considerable amount, whose number is 70,000; and the peasants or poorest class, who form the largest part of the population, 2,800,000. The Government is a limited monarchy; the king is the state, having well-nigh supreme power, notwithstanding his council. When he goes to Norway, a regency of five high officials rules till he returns. When he leaves both the countries, five more are added from Norway to the king's representatives in power. Charles XIV., the son of Oscar I., and grandson of Bernadotte, is now the sovereign. And within the last half century very great progress has been made in the freedom of religious belief and worship, in temperance, and in every department of popular reform and progress.

Nature is wonderfully varied in her aspect in Sweden. The scenery is constantly changing before the delighted

traveller's eye. Let us imagine that we are in one of the broad, hard roads of Sweden, which wind always in a serpentine course among the summits, travelling toward the romantic home of John Ericsson, of which I will tell you more soon. Now, look upward to the dark, overhanging rocks, forming a gigantic, threatening roof! It is grand and gloomy; but you need not fear. The loose fragments are removed, and solid granite arches your way. Glance down to that sweet meadow-land smiling on the opposite side of the highway, right in the face of the stern, unchanging sentinel. But granite pile and verdant field are gone, and we are in the deep forest of pines. The solid pathway is fairly walled in with the dense and sombre woods. How still and solitary! A belt of blue sky is above, and that is all beside the funereal shadow and music of the pine trees. See the sunlight yonder! Beautiful surprise! Green fields and grazing flocks greet the vision. It is like passing at a single step from the cemetery to the garden—from night to morning. Curiously stand the cottages on those sand-hills rising from the rural scene, on the brows of which "the wind agitates a few scattered pines." A bold and bald mountain leans against the sky just beyond. We will turn aside and climb to its top. Is it not an impressively beautiful prospect now? The vast forest—the embosomed, placid lake—the clearings, on which nestle hamlets and cluster flocks and herds, with no sound of

railroad cars or puffing steamers to break the deep silence—make a scene we shall never forget. In the winter it is all evergreen woods and dazzling snow, relieved by the homes of the people half-buried in the silver mantle.

Two things you will admire in Sweden if you are like a boy I know; there are no venomous snakes, or reptiles of any kind, and it almost *never thunders*. There are other things you would enjoy. The excellent fishing which the rapid and abundant streams afford, and the custom of riding the small horses or driving them before the sledges, which is common among the very children; and the skating and coasting for more than half the year.

You will be amused with the national dress still seen in Sweden, which was established by law in 1777, to prevent extravagance and luxury. The men, according to the statute, must wear a close coat, wide breeches, a girdle round the waist, a round hat, strings in the shoes, and over all, a cloak. The color was black. The women could wear a black robe, puffed gauze sleeves, colored sash and ribbons. The court dress required *white* gauze sleeves.

It seems quite ludicrous for kings and their councillors to make laws regulating a lady's toilet. But the object was to cultivate simplicity in all the habits of the people, while at the same time there was really no small degree of taste displayed.

The winters are long and bitterly cold—that is to say, generally so; and this is the kind the people prefer. To show you how they feel about it, listen to a conversation Mrs. B——, a traveller, had with a Swede. She went to the kingdom to spend the winter.

"I hope, madam, we shall have a good winter."

"What do you mean by *good?*"

"Plenty of snow and ice. The frost should come first; then the ice, and then frost again, and so on. Good, when it—what do you call this?" (moving a creaking boat over the floor.)

"*Crackles?*"

"Yes, that is it. When the snow *crackles from October to April.*"

The sledges fly, and the bright Aurora Borealis, or the moon, light them over the hills and plains; for the sun rises in midwinter at 10 o'clock, and sets about 2 o'clock in the afternoon. Short days, you will say. Yes, but the people make day of night, as you will learn in the story of our Swedish engineer.

The summers are brief enough, and very warm. Spring and autumn are scarcely thought of as such, in the sudden change to and from the vernal or autumnal period. Soon as the deep covering of snow and ice is removed by the heat of the sun the flowers appear, and the verdure hastens to perfection. A few months of brightness and bloom pass, and again, almost without

warning, the wild storms of sleet and snow come down from the rugged mountains. They not unfrequently beat upon the *green* leaves of the beech and birch, mantling with white the solemn pines and firs, till the buried earth in the dim air seems haunted with unearthly forms abroad on hillside and in the valley. The air is sharp and pure. Sweden is a very healthy country. The hardy, honest, staid people, live to a hale old age. In 1790 a census showed that during ten years there had been two persons, one of whom was 127, the other 122 years of age; forty-one between 111 and 120; sixty-seven between 106 and 110; three hundred and forty between 100 and 108; five thousand five hundred and seventy-six over 90 years old. What other nation can show such a health table?

"Isn't that remarkable? I should think people would go from other countries to live in Sweden," exclaimed a lad of a dozen years when I told this story.

"Yes," was the answer, "if long life is the only object of desire. The Dalecarlians are seldom sick, and very vigorous to an advanced age. But they live with great simplicity. Their food is often nuts ground with bark, and the plainest soups. The people of this country die young, because we live *too fast*. We eat too much, and too great a variety, and are always *in a hurry*. The aged people are becoming fewer apparently every year."

This reply made the young gentleman look sober, throw back his rounding shoulders, and, I hope, im

pressed him with the guilt and peril of *abusing* even the body. And here I will add a very lively sketch of "Rural life in Sweden" in summer time, by a modern traveller, and a great American poet, Longfellow.

'There is something patriarchal still lingering about rural life in Sweden which renders it a fit theme for song. Almost primeval simplicity reigns over that northern land—almost primeval solitude and stillness. You pass out from the gate of the city, and as if by magic, to a wild woodland landscape. Around you are forests of fir—overhead hang the long fan-like branches, trailing with moss, and heavy with red and blue cones—under foot is a carpet of yellow leaves, and the air is warm and balmy. On a wood bridge you cross a little silver stream, and anon come forth into a pleasant and sunny land of farms; wooden fences divide the adjoining fields. Across the road are gates, which are opened by troops of children. The peasants take off their hats as you pass. You sneeze, and they cry 'God bless you.' The houses in the villages and smaller towns are built of hewn timber, and for the most part painted red. The floors of the taverns are strewn with the fragrant tips of fir boughs. In many towns there are no taverns, and the peasants take turns in receiving travellers. The thrifty housewife shows you into the best chamber, the walls of which are hung round with rude pictures from the Bible, and brings you her heavy silver spoons—an heir-loom—to dip the curdled

milk from the pan. You have oaten cakes baked some months before; or bread with anise seed and coriander in it, perhaps a little pine bark. Meanwhile the sturdy farmer has brought his horses from the plough, and harnessed them to your carriage. Solitary travellers come and go in uncouth one-horse chaises. Most of them have pipes in their mouths, and, hanging round their necks in front, leather wallets, in which they carry tobacco, and the great bank notes of the country, as large as your two hands. You meet, also, groups of Dalecarlian peasant-women, travelling homeward, or townward, in pursuit of work. They walk barefooted, carrying in their hands their shoes, which have high heels in the hollow, and soles of birch bark. Frequent, too, are the village churches, standing by the roadside, each in its little garden of Gethsemane. In the parish register great events are doubtless recorded. Some old king was christened or buried in that church; and a little sexton with a rusty key shows you the baptismal font or the coffin. In the churchyard are a few flowers, and much green grass; and daily the shadow of the church spire, with its long tapering finger, counts the tombs representing a dial plate of human life, on which the hours and minutes are the graves of men. The stones are large and flat and low, and perhaps sunken like the roofs of old houses. On some are armorial bearings, on others the initials of the poor tenants, with a date, as on the roofs of Dutch cot-

tages. Nor must I forget the suddenly changing seasons of the northern clime. There is no long and lingering spring, unfolding leaf and blossom one by one; no long and lingering autumn, pompous with many colored leaves, and the glow of Indian summer. But summer and winter are wonderful, and pass into each other. The quail has hardly ceased piping in the corn, when winter from the folds of trailing clouds, sows broadcast over the land snow, icicles, and rattling hail. The days wane apace. Ere long the sun hardly rises above the horizon at all. The moon and the stars shine through the day; only, at noon, they are pale and wan, and in the southern sky a red fiery glow, as of sunset, burns along the horizon, and then goes out, and pleasantly under the silver moon, and under the silent, solemn stars, ring the steel shoes of the skaters on the frozen sea, and voices, and the sound of bells. And now the northern lights begin to burn, faintly at first, like sunbeams playing in the waters of the blue sea. Then a soft crimson glow tinges the heavens. There is a blush on the cheek of night. The colors come and go, and change from crimson to gold, from gold to crimson. The snow is stained with rosy light. Twofold from the zenith, east and west, flames a fiery sword and a broad band passes athwart the heavens, like a summer sunset. Soft, purple clouds come sailing over the sky, and through these vapory folds the winking stars shine white as silver. With such pomp as this is merry

Christmas ushered in, though only a single star heralded the first Christmas. And in memory of that day the Swedish peasants dance on straw, and the peasant girls throw straw at the timbered roof of the hall, and for every one that sticks in a crack shall a groomsman come to their wedding.

"And now the glad, leafy midsummer, full of blossoms and the song of nightingales, is come! Saint John has taken the flowers and festival of heathen Balder; and in every village there is a May-pole fifty feet high, with wreaths, and roses, and ribbons, streaming in the wind, and a noisy weathercock on top, to tell the village whence the wind cometh and whither it goeth. The sun does not set till ten o'clock at night; and the children are at play in the streets an hour later. The windows and doors are all open, and you may sit and read till midnight without a candle. O, how beautiful is the summer night which is not night, but a sunless, yet unclouded day, descending upon earth with dews, and shadows, and refreshing coolness! How beautiful the long, mild twilight, which, like a silver clasp, unites to-day with yesterday! How beautiful the silent hour, when morning and evening thus sit together, hand in hand, beneath the starless sky of midnight!

"From the church tower in the public square the bell tolls the hour, with a soft musical chime; and the watchman, whose watchtower is the belfry, blows a blast in his

horn for each stroke of the hammer; and four times to the four corners of the heavens, in a sonorous voice, he chants—

'Ho! watchman, ho!
Twelve is the clock!
God keeps our town
From fire and brand
And hostile hand!
Twelve is the clock!'

From his swallow's nest in the belfry he can see the sun all night long; and further north the priest stands at his door in the warm midnight, and lights his pipe with a common burning-glass."

Among the great men of Sweden are the splendid names of Gustavus Adolphus, the gifted and excellent sovereign, who was the friend of the Protestants, and Linnæus, the prince of botanists. There are others in science and in the state which would honor any land. No Swedish name of modern times is more widely known than that of John Ericsson. Whether the king Ericsson, three centuries ago, was a *distant relative* or not, we cannot tell. But make a journey over the sea to the southern part of Sweden, called Gothland. In the province of Wermeland, or Vermeland, as it is also spelled, are romantic mountains, in whose sides are mines of iron. Sweden has many deep, dark caverns, often several hundred feet in depth, which the miner has dug

Mountain Home, (See p. 26.)

after gold, silver, and iron. There, before a railroad was built, or a steamer ploughed river or ocean, lived quietly and prosperous in his business, a proprietor of some of these subterranean treasures. His name was Ericsson. He had a son John, born in sunny June in 1803. When only three or four years old he showed genius for drawing; surprising his friends with the childish exhibitions of his mental *bias*. Though genius without patient study and high qualities of character, is worse than useless—a dangerous possession, John was evidently endowed with rare gifts. Providence had given him a remarkable intellect, and a prominent place in the world's progress and a nation's deliverance from threatened ruin.

While other children of his age were playing with the common toys, he was watching the machinery of the mines, and with pencil or penknife was marking or cutting his little copies of what he had seen. Those mining localities are very singular places. When you visit them, your way among gloomy summits will open into a secluded valley or terrace of mountain-side, and right before you stand the grim flaming iron works. Near by are the mouths or openings of the mines, through which the valuable ore is sent to the light of day. Around the "works" are the humble habitations of the workmen. Half a century ago you might have seen John, a quiet child of half a dozen years, watching the movements of machinery contrived by the finest engineers, and prying

into the mechanism. Then with book and pencil, sitting down in the furnace-light, he would study the diagrams till he had mastered the principles they presented to his inquiring mind. Although he cared not much for the common pastimes of young persons, he kept and enjoyed of course, with everybody else in Sweden, "Jule-Afton;" pronounced Yule-Afton.

And what is that? you ask. The word means Christmas Eve; also used to express Christmas supper. And Christmas, you may know, is from Christ-*mass*—a Catholic service on the 25th of December, which, it is supposed, is the time when at dead of night the sky and hills of Judea were filled with heavenly music, because Jesus was born; and a strange, glorious radiance flooded all the landscape.

In Sweden, and everywhere in Christian lands where it is regarded, it is merely a holiday. If there is public worship, it comes in as a ceremony rather than a loving remembrance of the Saviour, the Great Benefactor of the world, the suffering Redeemer of a disloyal race.

Nowhere is this anniversary more generally observed than in Wermeland, the native province of John Ericsson. It is ushered in by a short religious service at 6 o'clock in the evening. Then look toward the market-place. Over the crisp snow the people are moving from their homes. Every lady has a lantern carried before her by an attendant, or in her own hand. No woman is seen

abroad after dark without one. The windows of the houses are ablaze with the Christmas flames. Enter the market, and amid the curious variety of articles for the season stand the *yule trees*, the little pines and firs, you know for what use. But how still the crowd is—nobody talks or laughs loud. This is the habit in Sweden. Then comes a supper of grŏt and lute fish; the former boiled rice, milk, and sugar, and the other dish, a *fishy* preparation which has a very strong odor. After supper the children kiss their parents' hands. Mrs. B——, who was there only a few years since, met one of John's Wermeland countrymen, who said of Jule-Afton:

"It is a joyful time for beasts and birds."

"Beasts and birds?"

"Yes, that it certainly is. At harvest time the yule-sheaf is put unthreshed away at every farmhouse, and on Christmas eve it is hung out on a high pole near the farmer's door for the famishing birds to make their Jule-Afton. If the yule-sheaf were not seen there, the people would believe that the farmer would have a poor season. They would think him a hard man, and not like to help him."

"And pray how do they manage for the beasts?"

"They give a double portion to them, and say: 'Eat well my good beasts, and thrive well, for this is Jule-Afton.' And the yule-board (or table) is spread with twice the usual food."

The morning comes, but not the daylight. It is six

o'clock, and the stars are clear and sparkling. The houses are illuminated, and the old and young are hastening wrapped in furs to the churches. These are really *trimmed* with candles, as ours sometimes are with evergreens, making a very novel appearance; the rows and rings of light almost bewilder you.

This Jule-Otte, that is, Christmas morning, is from three o'clock to six; and the Otte song is the early religious service. In the country around John's home the rural inhabitants go twenty miles often to a church to attend the Otte song. The sledges leave their home at midnight, and often *race* on the return, because it is believed whoever is first back again will have the earliest harvest, or the soonest marry if he be single. The races over icy hills and plains are sometimes dangerously swift. And then the music of the bells on the cold air lulls the lady into sleep, from which, if not careful, she never wakens on earth.

Look into the houses after the Jule-Otte song is over. A strange being walks in with masked face, a cap running up to a point, goggle eyes, and laden arms. It is the bearer of Jule-Klapper, or Christmas presents. To the house of a maiden who expects to be a bride soon, he has a barrel brought and rolled on the floor, which a grocer has sent. In it, under nice parcels of spice, &c., are beautiful presents from her lover.

Such is Christmas time in Wermeland. But these

scenes were not half so exciting to John at eight years of age, as to lads generally at fifteen. He loved better his pencil, and a fine piece of machinery to watch by the hour.

There are two other festivals universally observed in the country of Ericsson. The first is May-day, when the return of summer is hailed, for this is the season in a region where vernal and autumnal days are few. The young people erect a pole and dance around it, building great fires in the open air to indicate the advent of warm weather. The rejoicing is often continued all midnight.

Another holiday is at midsummer, when the heat is the most intense, and the harvest ripening. There is a religious service in the evening, and every manifestation of joy celebrates this brief period of "Sol's" welcome reign.

CHAPTER II.

The Boy-Mechanic—The Bride's Reception—Count Platten—His Ship Canal—The interview with Bernadotte—The Boy—Cadet—Engineer—Lieutenant.

IT is wonderful how the young student of great and small revolving wheels, engine strokes, and levers, advanced in his career, already chosen by his very taste and progress in mechanical science. Day after day, and year after year, he hangs around the miners who work the magnificent machinery, and make the iron shaft, the busy arms and fingers of wood and steel, his instructors.

He is nine years of age, and see him busy as a bee all alone. By him is a knife, gimlet, and pieces of wood. Work, work, is the history of John, till he stands smiling with the delight of success over a complete miniature sawmill in "running order." Nine years old, and the builder of a mill finished in every part!

"What! a mill just like a large one, and which if the

wheels and saw had been many times greater, would have made the logs into boards and timber?"

"Not only was this true, but it was a beautiful little structure—firm, neat, and tasteful. It is doubtful whether a child ever before wrought out so complicated and yet perfect a specimen of mechanism."

But go to his humble room, and take that plain, yet well-filled portfolio. It is a bundle of drawings. There are circles and squares, curves and straight lines; diagrams of great variety. You look at them carefully, and it is evident they mean more than "child's play." They are all plans of machinery. The mines and mills are fairly mapped out on those scraps of paper.

John has made his own instruments with which the beautiful work was done. Some of them are entirely new; the invention of his own prematurely active brain. He has become so absorbed in the fascinating study of mechanics, that he scarely notices the crowd pressing toward a habitation not far distant, in the clear, cold evening air. He is tracing dark lines on the smooth surface before him. It is a bride's reception. The custom in Sweden is, to have the lady who is married, after the ceremony, attended by two marshals with lanterns, to show herself on the balcony or in the window, till the people are satisfied. The marshals lift and lower their lanterns, and waive them, to shed every possible light upon the pale, and yet blushing bride. There she stands,

the silent object of inspection, turning her face and then her back; at length the last curious spectator goes, casting a backward glance to be sure the *seeing* is complete. Now she glides away, and sinks in the chair of her chamber, weary, and glad that the ordeal is over.

The boy at ten is married with loving heart, and the maturity of manhood in thought, to clear-eyed, fair, and faithful science—never deceitful, but always rewarding with the radiant smile of her highest earthly success the patient, devoted friend. Already John's marvellous attainments had reached the ears of the great men of Sweden. Count PLATTEN sought an interview with the boy. The nobleman sits down beside the stout, fine-looking lad, and turns over the drawings, looks at the "tools" he invented and made, and at the saw-mill, and questions him about them all. John answers promptly, distinctly, and in a few words. Then handing the diagrams back to him, he remarked with impressive earnestness of interest in what he had seen: "*Continue as you have commenced, and you will one day produce something extraordinary.*"

I must tell you something about Admiral Platten, for he had this title also. He was the engineer of that wonderful achievement of skill, the Gottenberg Canal, intimately associated, as you will learn, with the miner boy's success. It connects by water the capital of Sweden on the Baltic, with the North Sea, three hundred miles apart,

and yet not more than fifty miles are canal. The rest of the distance is a series of lakes and rivers. At the Cataract of Tröllhatten, where Lake Wemer has its wild outlet in the river Gotha, the scene, to the traveller, surpasses any thing of the kind in the world. The river Gotha empties into Lake Hielmar.

The rushing stream plunges down a precipice one hundred feet in height into a chasm of fearful depth and wildness, by four successive leaps over battlements of rock. The Channel of the Gotha had been cleared for navigation up to the magnificent barrier of the Falls, which thundered defiance in the face of kings and subjects. Charles XII. employed Polham, the distinguished engineer, to construct a canal, if possible, around the cataract. But there stood the mountain of granite, and to get through it was decided to be impossible. The enterprise was therefore abandoned, till Count Platten's genius hurled back with the thunder of blasting granite, and the sound of the busy hundreds of mechanics, nature's defiance. He bearded the giant, for ages unmolested in his den of thunder and foam. Tröllhatten, or Tröllhatta, means *sorcerer's manor*. Tröll is the gigantic conjuror, who, the superstitious believed, had his home here, and performed his mad antics with the flood. His *hat* lies near—an immense rock, hollowed or scooped out, making quite an apartment. Into this visitors go, and write their names all over the inside of the hat.

When Carl Johan, that is, Bernadotte, King of Sweden, was there, many years since, with his royal company, he entered the covering of the old giant's head. Right in the rapids below the cataract is an island, around which the waters boil and roar fearfully. There is a story that a tailor's lady-love refused to marry him unless he would sit on that spot of land thus fearfully encircled by the furious tides, *till he had made a pair of pantaloons*. You must understand that like looking from a high and narrow bridge, or the brow of a precipice, the dash and roar around the rocky foothold would turn with dizziness the heads of most people. Indeed a sentimental Frenchman was so overcome, that he fainted.

But the poor tailor was deeply in love, and was resolved to have a fair trial of the sorcery of roaring Tröll, rather than lose the idol of his heart. So away he went, with cloth, buttons, thread and needles, and getting safely over to it, commenced his work. He thought of *her*, then glanced with a thrill of terror at the boiling eddies around him, and again plied his needle. The hours wore away, and the excitement became unendurable. The fascination often felt in similar places, seized him; and rising, he plunged, "pants" and all, into the angry current, and was seen no more!

Should you travel on the Grand Canal, you will not forget the story when you get to the wave-rocked seat of grim and ancient Tröll. Such are the strange and even

wicked superstitions and perverted affections of the human mind and heart apart from pure religion. As the steamer urges its way up the waters, you see in the distance what seems to be a white cloud hanging from the mountain side. But when nearer you hear the roar of a cataract, and then behold the descending flood which from afar was a snowy crown of the rocky battlement. The river is now angry and crested before you. Up, up the dizzy height you gaze, and wonder how your boat can get to the peaceful lake beyond it. Massive gates open, the steamer passes in, and they are shut. The first lock is entered. The water flows into it, surging back and forth, but all the time lifting the burden higher. After reaching the highest point which could be secured by this terrace, the steamboat goes through other gates into a similar lock.

If you have seen the canal-locks, you will comprehend the marvellous mountain climbing. You can imagine large chambers cut in the side of the mountain, the floor of one on a level with the top of another below, till these rooms, like the stories of a house, reach from the base to the brow of the summit. Then let the steamer pass in, the water flowing into the lowest chamber, close behind the boat through the gates, and let in water above, till it lifts the burden upward to the bottom of the next lock. The vessel passes in, gates again shut behind it, and on the swaying flood it continues to rise. Thus it is upborne along the majestic pile of massive rock.

Scaling the mighty walls of Tröll's manor on these gigantic stairs, the silent navigator rises, until the bright lake beyond is gained; and away, puffing and dashing aside the spray, it glides, as if exulting to be free again Think of twenty such locks, at one spot, in this grand canal! What an engineer, and what engineering, to thus overcome natural barriers, which seemed to defy the genius and power of man!

Near the beautiful Lake Motala, and extensive iron works, lie the ashes of Admiral Platten. The very puff of the steamer along his marvellous path of travel, salutes his grave in its long marches. Think of three hundred miles of such varied scenery—rivers, lakes, miles of deep excavations through solid rock, mountains terraced with locks, looking like "the wards of a giant's key," combining the sublime and beautiful in every possible variety and degree.

Along the coast of the Baltic Sea, called Skaregard, which means a place of rocky islands, the ship canal has its highway for a great distance among rugged little isles and huge boulders. The channels are marked with various signals. Sometimes a pole, then a half-sunken rock painted white, is the sign of peril—silently admonishing of the danger of a deviation from the channel cleared and marked out for the traveller. Is it not an impressive illustration of our moral pathway through time to eternity?

Like all highly-gifted and noble natures, Admiral

Platten *thought and acted for himself.* When he was sure a thing was right and possible, he went forward with it, in the face of opposition. The nobility of Sweden, and the people generally, opposed as chimerical the project of this Grand Ship Canal across a kingdom and over mountains. He remembered the story of Columbus, of Galileo, and others, who reached a shining goal of success through scorn and even bitter persecution. He died viceroy of Sweden, acknowledged to be one of the greatest men in northern Europe.

Count Platten was on familiar terms of friendship with Bernadotte, King of Sweden, who, you will recollect, was Marshal of France under Napoleon Bonaparte. He was called to the throne of the kingdom in 1818. He placed implicit confidence in Count Platten, admiring much his rare ability, and the monuments of his engineering attainments. The encouraging attention and words which the count gave to the boy, were like a trumpet-call to his life-work. We never knew the influence of our speech upon others. The engineer of the Gottenberg canal did not appreciate the effect of his cheering expressions. John decided at once to emulate the splendid example before him. Very soon after the conversation with Count Platten, John received a high compliment from his distinguished friend. By his influence he was appointed a cadet in the corps of engineers. In other words, he became attached to the engineering corps as a pupil, to pre-

pare for active public service. He watched these able mechanics, and learned with a rapidity seldom known in the experience of one so young. The men were surprised and delighted with the boy, and took pains to answer all his questions, earnestly but modestly offered. Only six months of tuition passed before he was made *Nivelleur*, that is *Leveler;* in other words, he was an engineer on the Grand Ship Canal, under Count Platten. In his thirteenth year he was ordered to lay out work on the national highway for six hundred men. The workmen were soldiers of the regular army. When they are not wanted for the battle field, they are employed by the Government on any improvements for the benefit of the State, to which they may be assigned.

Did you ever before hear of a boy engineer in the command of six hundred of a king's troops, and that, too, on one of the grandest enterprises ever carried forward by royal power and treasures? The army regulations are very strict in the old world. It is a sternly-enforced rule in the military department of Sweden, that the soldier must uncover his head when he addresses a superior. See that gray-haired veteran come to John with cap in his hand, and a respectful bow, to receive instructions in his labour! and he is a single subject of the child-king over a realm of more than half a thousand willing soldiers! Again, look at him while taking surveying observations along the rugged line of the broad channel to be

JOHN AT TRÖLLHATTEN FALLS ON THE GRAND CANAL, (see p. 40.)

opened for the waters. His eye cannot reach the levelling instrument. He has grown faster in mind and knowledge than in stature. Attendants are at hand, and place under his feet a stool. Now he can put his clear eye before the sight, and at a glance catch the angles and get the bearings desired. Down he steps, the stool is borne behind him for the next pause of observation. It is almost ludicrous to think of those strong, whiskered, bronzed soldiers of Bernadotte, the king, led about by the ruddy unpretending boy, and obeying his commands with as much deference and promptness as they would their sovereign's. But such is the might of cultivated minds when brought into the service of royalty. In this country it would be more difficult to secure obedience to the command of one so young; there is too little reverence for authority here, either national or parental. This tendency to throw off restraint is a threatening sign of the times. Few young persons apparently cultivate that beautiful respect for parents, teachers, and rulers, universal in our land many years since, and still found in Sweden.

When the severe winters of Sweden suspended the business on the canal, John devoted the long evenings to studies with his pencil and paper, as he had done before he thought of being an engineer to the king. And you would find at the present time, along the Grand Canal, various improvements from the diagrams wrought out by this child of mathematical science. The stupendous

achievement of Count Platten became a world of engineering interest to young Ericsson. He commenced drawings of all the machinery and implements connected with it. The employment was his pastime. When fifteen years of age, he had from his own hand a complete portfolio or panorama of the Grand Canal, three hundred miles in length, with all the tools used in the mighty task of cutting away the mountain sides, building upon them the staircase of locks, and piercing other summits in this conquest of nature by science. But all the while, unconsciously to himself, John had been drinking in the martial spirit from his soldier-workmen and the officers with whom he was associated. Is it not strange, that with all the hardships and perils, the separation from friends, and subjection to unquestioning command by superiors, there should be such fascination in military life? The trappings and the music, the romance and honors attending it, generally attract all the men needed by the State, even if not compelled to enlist in the service.

Two years later, when seventeen, he entered the army. He knew well the enthusiastic devotion of his noble friend, Count Platten, to mechanics, and that he supposed his *protege* had decided to devote himself to the same congenial calling. The count was proud of him. But John must and would try *soldiering*. And before his patron dreamed of the new passion, the die was cast. Soon as he heard of it he had an interview with the miner-boy,

and urged him not to leave a career so brilliantly commenced, certain in its high reward. John listened, but heard the drum and fife in fancy too, and saw, instead of burnished mechanism, the sword and bayonet. The count grew excited. The lad persisted in his choice. With angry words the nobleman left him. The ensign, for this was his rank, loved and admired with reverent gratitude his benefactor, and felt deeply his indignant protest. Firmness and tenacity of purpose were characteristics, as you have seen, from earliest experience, and try the soldier's profession he would.

Providence seemed to frown at the outset upon his change of purpose. His colonel, Baron Koskull, recommended young Ericsson to Bernadotte for promotion. But on account of some misconduct he was disgraced by the king at the very time he made the request. The king therefore rejected the proposed and deserved honor for Ensign Ericsson. It is quite probable that the intimacy existing between him and Count Platten, through which he must have learned of the nobleman's displeasure, before mentioned, had something to do with the failure to secure the appointment. Baron Koskull displayed a real interest in his ensign. Chagrined and irritated at the rebuke of his sovereign, he, notwithstanding, determined to press his suit. Having a finished and accurate military map which the young soldier had prepared, he took it to the son of Bernadotte, his Royal Highness the Crown

Prince Oscar. Calling his attention to the remarkable work of the youthful ensign, he entreated him to intercede with his father, the king, in Ericsson's behalf. The prince examined the beautiful creation of genius, expressed his admiration of its rare excellence, and bearing it in his hand, went to his majesty in person, and asked for the author's promotion. The map and the petition of Prince Oscar prevailed. Ensign Ericsson was created lieutenant, in accordance with the baron's recommendation. It so happened that at this crisis in the military career of the engineer, the Government had ordered a careful survey of the Northern portion of the realm. It was a difficult and laborious service, requiring the best talent and culture in the kingdom.

CHAPTER III.

The King's Surveyor—The young Lieutenant's Examination—The Appointment—Romantic Service—Other Labors—Fulton and Ericsson—The Flame Engine—The Wooden Railroad—The Locomotive—The Exciting Race.

THE king turned for the man he wanted to his army. Away in the cold north, where snow glowed in aural splendors, and mildly shone like plains and summits of silver in the light of the moon, was stationed Lieutenant Ericsson's regiment. It was there the surveyors were to traverse the provinces, wrapped in furs, with the frosty implements of surveying in their hands. The culture of his mathematical powers under Admiral Platten, had given him confidence in his ability to hunt the tortuous boundaries of his native land.

He hastens to the national capital. The Board of Examiners open the ordeal. The lieutenant is called up for trial.

It is a new and strange scene for him. Veteran officers are his questioners. The ruddy youth of seventeen

calmly stands forth, and the tests are applied. Problem after problem, which might bewilder an older brain, is clearly solved. The profoundest depths of practical mathematics are sounded, and the miner-boy wins only applause.

The examiners are surprised, and are curious to know how it is that he uses Euclid's Geometry so freely and correctly. It turns out that he has *mastered* it like Euclid himself. His memory is not remarkable, and therefore he does not repeat the demonstrations, but he knows perfectly the principles, and could write a geometry himself. This was the foundation of his success in engineering. Triumphant in the examination, he was appointed Government Surveyor for Northern Sweden.

Some young reader may sigh over such early distinction, and say to himself, it was *genius*, and I could not, if I tried, imitate him. You *could*, in just what made him and Lieutenant-General Grant great, *hard study* and *reliable character*. Without these, neither would have succeeded. More have risen from obscurity by these two means of high achievement, than by all others. It is wonderful to know how much they will make of a common mind.

The surveyor returned to the highlands, delighted with the new field of action. The youthful officer was in his element again. Over hill and through gloomy valley, along the mountain slope and rushing river, the lieu

tenant goes with rapid marches, yet omitting nothing important in the survey. It was a romantic yet intensely laborious service. Quite different from similar labor in this country. Wild, rugged, and often awfully desolate, only a few hours of sunlight most of the year, it was duty which no constitution but the firmest could have borne, performed so rapidly and well. Though the youngest of the surveyors, he did by far the most work in a given time.

Do you know how he received his *mails* in that wild region? The dwellings stand apart in the country, and there are but few villages in large districts. Queen Christiana made new arrangements in respect to the mail-service.

Lands at certain distances along the routes of travel were given to the occupants, who, in return, were to see the mails transported over the country.

In summer you might have seen a little boy, sometimes a girl, riding a poor old horse, *all alone*, upon the desolate plain, through dark fir-tree forest, and across the rapid stream, and then over the mountain crest. No one thought of robbing or disturbing him—such is the honesty and respect for law in Sweden.

When the long winter came, the little carriers would take the sledges, and away they would glide over the ice and snow-crust for many miles, till they reached the next stage in the long route. Then another post agent hurried

off with the precious burden to the scattered people of the north.

Young Ericsson made with his own pencil and pen maps very minute in contents, of more than fifty square miles, which are preserved in the archives, or repository of public records, at the capital of Sweden. The restless, vigorous brain of Ericsson was not satisfied with his labors as surveyor. And here I must tell you that he would have failed to accomplish so much noble service, had he not taken care of his physical frame. You know that a strong engine in a frail steamer would soon shake it in pieces. It is the same with brain-power, unless sustained by a healthful bodily system; it must break down the man, and make him a useless wreck of a splendid, self-moving machine. God, who formed, requires the utmost care of both the immortal worker and the body which enshrines it. The lieutenant has a sound mind in a sound frame-work, which was kept, by habits of temperance and regularity, in excellent tone.

He undertook now a magnificent volume, with sixty-four engravings, on canals. The plan was to describe, and have pictures of every thing connected with the building of canals; all the machines, locks, bridges, excavations, and means of navigation. Major Pentz, a German officer and engineer, was his associate in the grand and expensive undertaking, writing the text in his native language, that it might have more readers than it could in

the Swedish tongue. The compilation of the enterprise was delayed by various labors, and owing to new discoveries it was suspended. He was about twenty years of age, and had no superior in engineering in the kingdom. He was constantly making experiments, suggested by what he saw and learned. There had been progress in the New World, which had set his genius on a new track. In 1807 you might have seen a curious crowd on the banks of the Hudson River, watching the builder of the first steamboat and his humble craft. John was then four years old, and pencilling his first diagram of machinery. Fulton had dreamed over his invention, and wrought it out amid unbelief and even ridicule. The multitude could scarcely believe their eyes, when the odd-looking structure started off a little faster than ordinary driving on a good turnpike. But the patient inventor saw already his reward, and consoled himself with the reflection, that it was nearly a century after Barth Schwartz invented gunpowder before it sent iron balls from the cannon's mouth.

Other equally important discoveries of genius had slowly won their way into popular regard. What progress in the use of steam, while young Ericsson was mastering the machinery of the mines and of the Grand Ship Canal! With a new idea in his mind, he makes a visit to his colonel's house.

"I have motive power with heat, and without steam," says the lieutenant.

"And how is that?"

"The young officer has prepared a small contrivance, in which he condenses the flame, and like steam, but with perfect safety, it will propel machinery."

The colonel looks at it with glad surprise; for he, too, is a devotee of science. Then, as Count Platten did when he first saw Ericsson, he urged the maturer genius forward, assuring him he had struck a new and most important principle in motive powers.

Encouraged and stimulated by the words of his friend, he seeks a body for his principle. With tools and materials and time see how enthusiastically he studies the *how* to accomplish this. What cares he for the "spree" of the fast young man, or the lover's song. His silent bride, science, is the fairest companion the wide earth can offer him. Work—work—work! Oh, unresting brain, what next? The days and weeks pass. Now look! There stands a beautiful engine, with crank, and wheels, and the entire harness for service. He starts it, and it moves with force equal to a steam-engine of ten-horse power. There is no rush of vapor from its prison, and only a small quantity of fuel. A Flame Engine! But Sweden is too near the North Pole, too isolated from the great heart of the world, for the advent of such a wonder. Scientific, mighty England, is the theatre for its appearance. The colonel petitions the king, and he consents to let his gifted subject go.

He left Sweden near the middle of May, 1826, just as the fetters of the long winter began to melt away from his native realm. On the 18th he reached the shores of the British Isle. His heart beat high with hope. Scientific gentlemen admired the Flame Engine, which had moved so finely when heated by the ignited pine splinters of the highlands of Sweden. The fuel of England, you know, is *coals*, as they call the exhaustless product of their coal-beds. Many miles of immense caverns are the subterranean world of thousands of English subjects. They have much less daylight than the Swedes, passing life away by the dim flame of candles.

The Englishmen, therefore, must try coals for the Flame Engine. Alas, for the youthful engineer. The fire of the mineral fuel was duller, and affected so injuriously the engine, that it soon became worthless. This was no pleasant joke for John Ericsson. The expenses of travel and machinery must be paid. Honesty was ingrained in his nature. What shall be done? His brain is his *bank*. He must draw on *that*. From it soon went forth to the Patent Office of England pictured inventions of great merit; only one of which, we will notice here. It was a steam boiler for *artificial draft;* i. e., to draw a burden. The year before the first railroad for passengers was built of wood. The cars were drawn by horses. This was thought to be a grand affair. Such smooth

riding! and then how many more a horse could draw along the wooden track!

In 1829 the first locomotive was brought to this country. The earliest engines used had a speed of only fourteen miles an hour. John Ericsson had sent to the Patent Office drawings of a *revolution* on the new tracks of travel in the rate of speed. He was a youth of twenty three, and rightly thought the influence of a well-known engineering mechanic would gain public confidence. Mr. John Braithwaite was among the "lords in this domain of thought." With him he joined his fortunes.

The same large, vigorous brain, which created machinery rapidly as most young heads do "vain imaginations," was now sure of an invention which would atone for the loss on the Flame Engine. Into his room he goes, a willing exile from the haunts of the surging throngs of a city. Like the anatomist over his table, on which lies, to be *taken apart*, a human form, so "fearfully and wonderfully made," Ericsson bowed over his drawings and models to construct his metallic giant. The weeks again have sped by, and genius and labor triumph. The Swedish stranger is railroad king though he does not know it.

The directors of the Liverpool and Manchester Railway had planned their stationary engines for drawing the carriages. They were first ready to put up these *immovable* machines for moving from one point to another

the passengers and freight. The wise idea was suggested of trying the engineering talent of the proud Empire, for something better to propel the cars. In the autumn of 1829 a prize of five hundred pounds sterling was offered for the best locomotive engine. The inventors were to have a day of trial on the small portion of the finished track. Lieutenant Ericsson was too busy to read all the advertisements, and had not seen this proposal, published in some of the papers, until seven weeks before the *race* was to come off. But such a mind as his knows no *can't*. He decided to enter the lists. His invention, built only in lines and models, must be embodied in a locomotive. Never did an earnest man bend his energies more closely and mightily to a task. The engine is planned, the patterns made, and the ringing of hammers heard. The large, round boiler, takes shape under the strong hands of the best mechanics. "Ding, dong!" go the strokes on the rivets. Piston-rods and driving wheels are ready; and when the morning of trial dawns, its light gleams along the polished angles and points of the miner-boy's locomotive! The sun ascends toward the zenith, and pours its beams on thousands of people whose paths lie toward the railroad, on which the iron horses are to test their speed. The throngs sweep along the track, and for a mile wall in the straight pathway of the steeds, whose "sinews are of steel, and whose provender is fire." There was no "betting," for an opportunity had not

offered. The race-horse had hitherto borne the palm for speed. And which of the iron monsters, if either, would exceed this, was all conjecture with the speculators.

"Well," remarks one, "I think if she goes ten miles an hour she will do well."

"And who would risk his life on greater speed than that?" replies a farmer, content with his cart, and three miles per hour.

The foreign lieutenant felt sure his horse would win. He was in no hurry to try his "*metal*." At length the signal was given. No whip in the hand of a rider, or between light wheels, is heard in response. In the deep silence of suspence, a hand is laid upon the lever which opens a valve. The imprisoned steam rushes into the piston-cylinder, the rod moves, the crank swings round, the heavy wheels revolve, and away the "Novelty" glides at the rate of more than fifty miles an hour! On the fleet iron-steed, John Ericsson and John Braithwaite hold the reins with perfect control of his resistless advance.

"Hurrah! hurrah!! hurrah!!!" now breaks from the vast concourse, like the "sound of many waters." Again and again the thunders of wild applause drown the sharp voice of the escaping steam, and the heavy sound of the ponderous wheels. Back and forth the tireless racer flies. The astonished populace shout, wave hats

and handkerchiefs, while the *stockbrokers* are adding *ten per cent.* to the shares of the Manchester and Liverpool Railway. This is the money-market estimate of the invention, quite as reliable, my young readers, as the hurrahs.

CHAPTER IV.

Disappointment—Not Discouraged—The Invention doing good—The Steam Fire-Engine—A Fire—Another Conflagration—The Gold Medal—Various Inventions—Ships—Steamers.

MY young reader, have you ever been disappointed? Has some bright vision of success in life-plans, or pleasure near, vanished in a moment? This is one of the saddest lessons of human experience, and yet one of the most common. The world does not meet our hopes, nor can it satisfy the aspirations of the soul. Our miner-boy had not known a more unexpected, and for a time, perhaps no greater disappointment than one he was doomed to experience now. It seemed to him, and to all, that to draw carriages along fifty miles an hour, instead of a dozen, the highest rate of speed in travel before, would bring the inventor fame and fortune. The great discovery of *harnessing* the steam to draw like horses, only many times faster, was *real*. The Swede was the prince of inventors here. But at this

moment an accident, as we say, apparently a mere chance hint, which was Providential interposition, plucked the honor and the golden reward from his hands. It was an improvement, by another mechanic, in the application of the locomotive power. The engines made by it were more convenient and more serviceable. The brave worker in wheels and steam showed no token of discouragement. The beautiful boiler was smaller than any thing of the kind before. The notion had been universal among scientific men, that there was no way of getting a large amount of steam in boilers so short, compact, and light. The *Novelty* blew, with its hot breath, that wise conclusion to the winds. And now see how the failures of cultivated, well-balanced, patient intellects, are successes after all. That is, they contribute to the world's progress—lead to something of enduring value. It was now 1830. The inventor had been in England four years. After a few weeks more of thinking, Mr. Ericsson said to his friend, Mr. Braithwaite: "I have another use for my principle in the construction of the steam-boiler."

"And what now?"

"We will have a steam fire-engine."

Neither Mr. Braithwaite nor anybody else had then thought of making fire and water put out the flames of a conflagration.

In the earlier periods of English and French history, there was a singular and rather a beautiful protection

against conflagrations in cities. The *curfew bell*, which you know was, at eight o'clock in the evening, the signal for putting out all the fires. So, whenever the

"Curfew tolled the knell of parting day,"

the guardians of the homes of the people must at once extinguish the flames which warmed them, and soon no smoke till the next morning curled upward from the countless chimneys. Excepting such precautions, the only means besides buckets of water in the hands, and some local contrivances employed to extinguish fires, till 1830 were the engines you have seen worked by men. Up and down the long wooden or metallic handles went, till the tired firemen sometimes were ready to drop exhausted to the earth.

Work! work! again, is the quiet, fascinating life of the engineer. The time flies, and look! a new thing under the sun glitters in its light.

"What *is* that?" inquires the curious spectator.

"You will know when it is needed." And soon it *was* wanted.

"Fire! fire!" rings along the streets of London The bells sound their alarm. Away rattles the first steam fire-engine to try its power over the flames, spitting sparks in its track, and puffing columns of smoke. The beautiful Argyle Rooms are wrapped in the ruddy and devouring element. The excited crowd are there. The

hand-pumps of the old machines sound on every hand. The curious intruder opens its stream of water; steady, full, and high it curves over the red battlements. Genius has won a triumph which will be felt in every land.

The King of Prussia, in 1832, ordered of Messrs. Ericsson and Braithwaite a similar engine of larger dimensions, and consequently of greater power. And one night, in the splendid city of Berlin, Prussia, the fire-alarm sounds upon the still air. The throngs surge through the streets. The engines go rattling along the flame-illumined highways. It is a fearful conflagration. The King's steam fire-engine comes to the rescue; into the waving banners of fire, the jet of water streams; soon they begin to droop, and the victorious defiant element recoils before the invader of his red field of ruin. A number of elegant buildings were saved from the destructive fire by the timely appearance of its noble antagonist. The people watched the engine as if it were a living giant; and were ready to cheer the protector of the city whose fiery heart had fought so well the very foe which was a friendly power in the iron harness of the beautiful machines.

The Mechanics' Institute of New York saw the work of genius in the unequalled steam fire-engine, soon as the foreigner came to our shores. In 1842 that scientific institution gave John Ericsson a large and richly-embossed gold medal. The only difficulty in Captain Ericsson's fire-

engines was the time required to "fire up." After the preparation to work the machine commenced, it would be twenty minutes before the jet of water could be thrown nearly a hundred feet. The first one, of six-horse power, would discharge a hundred and fifty gallons per minute. Still, like every thing else which is an innovation upon old customs, the invention received but little attention until Mr. A. B. Latta, of Cincinnati, Ohio, made a great improvement, his patent requiring but five or six minutes to get the engine ready to work, and successfully introducing the invention to the public.

While sojourning in England, Captain Ericsson made several very valuable inventions—improvements in engines and machinery; but while of great value, and the result of deep study, there is one which eclipses all others. This creation of his fruitful brain would alone have immortalized his name. It is the now world-wide *propeller*.

Before I tell you how he came to think of it, you should have a clear idea of the different kinds of vessels for ocean navigation, and the progress of improvement. For when you think that two-thirds of the globe's surface are covered with water, and that not only would the continents be distinct and almost unknown to each other as the worlds in space without the ships, but some of the fiercest and most decisive battles in the history of nations have been fought on the sea, you will appreciate the greatness and value of the inventions and improvements

in navigation. And it is not long since a bright-eyed boy inquired, "What are men-of-war and monitors? and how do soldiers fight on the sea?"

Here is the answer: I will begin at the beginning. Anciently, the only vessels built were flat-bottomed barges, or boats resembling those used on country ferries across rivers. They had small sails, or were propelled by oars. Sometimes there were in the larger ships banks or rows of the rowers, so that many oars struck the waters at the same moment. There were two ways of fighting. Vessels were constructed with sharp iron prows, with which the enemy's ships were pierced, or crushed. The water rushing into the breach finished the work of destruction. Another method of warfare was, to come close together, usually side by side, even fastening to each other, and then hurl the javelins, strike with spears, and use other missiles of death; for gunpowder and guns, you know, were not used at all till about 500 years ago. This kind of naval fighting was called *boarding* the ship. The discovery of the magnetic needle, and the voyages of Columbus, gave a new impulse to navigation.

Henry VII., of England, who was crowned December, 1487, founded the British navy. Under his sceptre, was built the "Great Harry" and the "Sovereign of the Seas," which carried one hundred guns. Indeed, the English *over-gunned* their men-of-war, or large ships built and fitted up for ocean conflicts and defence. The

great number of cannon pressed the ships down too much in the water. The lower port-holes, *i. e.*, apertures in the vessel's sides for the mouths of the guns, had to be closed in a storm, to keep the waves from dashing into them. Of course many of the cannon were useless excepting in a calm.

In 1779 General Melville, of the English navy, invented carronades, thus named from Carron and Company, in whose iron-works they were cast. They were short, large-mouthed guns, for throwing shot in a short course or arc into the enemy's ships. It was then a great improvement in the arms of the navy. Forty years later there was another revolution in naval warfare, by an invention of the French commander, Paixhans. It was a cannon for hollow shot or shells, exploding after striking the ship or fort. It had a large tube, with a narrow chamber for the powder at the end. Napoleon Bonaparte saw the awful havoc bursting globes of iron would make anywhere, especially in the deck and sides of a ship. When he contemplated an invasion of England, he had his ships at Boulogne armed with howitzers, that is, short guns for throwing hollow shot.

Long after steam was employed in navigation, it was not thought of in war vessels. The reason was, the wheel-house being on the sides of the steamers, it was exposed to the fire of the enemy. A single ball or shell would crush the machinery for motion, and leave the

boat at the mercy of the waves and the foe. But some were introduced because of speed, and the room on deck for platforms and wooden railways, on which the cannon could be elevated and turned in different directions.

The white wings of canvas were, however, the principal dependence in the movements of the navy.

In our Revolutionary struggle, and in the last war with England, the frigates, which are war vessels larger than schooners, and not so large as the regular men-of-war, or ships of the line, did the best fighting on the sea. The Constitution and the Ironsides every boy has read of in the history and poetry of the land.

Before describing the next grand revolution in naval warfare, you must learn more of the work of the miner-boy in his riper years; for the navies of the world are indebted to him for two of the most wonderful inventions ever known, or ever likely to be known, in ships of war.

CHAPTER V.

The New Wonder—Birds the Inventor's Instructors—The Miniature Ship and Sea—The Noiseless Triumph.

THE great Swede is commissioned by Providence to add to the naval leviathans a new wonder of motion and strength, which is itself to be only the herald of a still greater one many years afterward to be created—the miner-boy's *Monitor*. Hitherto, as you have seen, all sea-going vessels were moved along by the winds, galleys of oars, and wheels at the sides, acting directly on the water.

Captain Ericsson had observed the flight of birds, and the motion of fishes, whose swimming power is chiefly in their tails. If you have not watched them, and will do so, you will soon perceive that the wings and fins do not, like oars and wheels, strike nearly in a direct line against the air and water, but with an *oblique or wavy motion* The eagle cannot turn his wing horizontally, *i. e.*, at right angles with his body. Much less could he sweep the cir-

cle, had he the power to attempt it, without breaking bones, or at least twisting and bruising the muscles and blood-vessels and tearing the plumage. So he lifts the pinion, and brings it down with an oblique blow against the air, which drives him along in whatever direction he steers his aërial bark.

It is by a similar process that the fish uses his tail-fin, propelling his body, which he guides and also urges along with the little side-paddles and *rudder* on his back.

The question got into Captain Ericsson's massive brain, and would not leave without an answer, Why cannot ships be borne along by an application of this natural law? He thought and dreamed in his very sleep over it. There was a serious difficulty to which we have indirectly alluded—the wing and tale did not *revolve;* the wheels of the ship *must go round.* But God—whose wisdom is infinite, and therefore combines the greatest variety of uses possible in the perfect adaptation of what he makes to fulfil its design, made the wings and fins for other purposes besides motion. They are a part of the body, and share in all its life and beauty. God's "way is perfect." The ethereal and the submarine navigators are specimens of this skill which unite in an indivisible whole such a number and variety of functions, or offices, each dependent upon, and in entire harmony with the others. But in the use of natural elements and forces, it is designed that man should exercise his divine inspiration of inventive

thought. We are to take the *hints* which the creating mind gives us in the perfect workmanship of the sovereign will, and overcome difficulties in the way of human progress, by profound study. God *never thinks*—every thing was forever and will always be present, and unclouded to his view. We *must* think, or be dwarfs intellectually, and morally triflers. For all genius and study can do, is to find out so much of the Infinite in his works and word, as to advance us in knowledge, goodness, and usefulness, both individually and in all social relations. The genius of Ericsson had taken a hint, and he was sure it *would grow* into a practical form.

"But," said an engineer, "you will lose half your motive-power—the paddle which strikes the water in a slaunting or oblique direction, instead of squarely—that is to say, at right angles like the wheels of steamboats—will not *push* as hard. It will slip through the water without propelling the vessel."

The Swede had thought of that, and replied: "You don't reflect that the *lighter the blow against the water, the less engine power will be required.*"

Let us go to the birds again, and observe how easily and gracefully they rise with this semicircular sweep of their wings. You can perceive at once, that if they had to strike directly against the air, just as you would with a fan, or your hand, it would demand more strength while it gave a greater impulse forward. The truth is, Captain

Ericsson at first supposed there was force in the objection. And how do you imagine he saw the fallacy of it?

A grand and Christian idea flashed over his quick and comprehensive mind. It was this: "The great Mechanician of the Universe, in enabling the birds, insects, and fishes to move through their respective elements, had adopted the oblique motion as a universal principle."

He was sure that God could make *no mistakes*. If the honey-bee had taught all mathematicians, in the structure of the cells of the comb, how to make the best reservoirs of the sweet drops, combining strength with economy—the life and instinct of other animals must be equally true to Him. He knew, also, that men are slow to see and believe that there is a *law of compensation* for any apparent loss everywhere, if we will find and apply it. Satisfied that there could be invented and built machinery with the oblique stroke, which would be an improvement in many uses of it, over any other—because the wisdom of Jehovah had made, and was constantly filling the air and the waters with its moving life-barks, large and small—he went to his task.

What cares he for the French Revolution across the Channel? What to him was the expulsion of the Bourbons, and the enthronement of Louis Philippe—and the whole question of the "divine right of kings," compared to his royal privilege, his divine right to interpret practically and beneficially to the race, the wisdom of the

Almighty Sovereign? Brave, earnest, high-priest at nature's shrine! looking from it "up to nature's God." The Lord must be *right*, "whatever philosophy, falsely so called," might declare.

Into the laboratory like a hermit, goes the noble inventor; for whenever he has a task of the kind, he shuts out the busy world—will scarcely see his friends. From morning till night he plies the pencil, and turns over the models. It is no unwilling confinement and labor. His genius is fired with a new discovery, and glows like the furnace-flame upon the *solution* of his problem; the tangible and successful realization of it in *human* life. He is to create a *water-bird*, or *mermaid* whose motions man is to control and guide.

Nobody cares for the secluded toiler. When it is mentioned to an educated mechanic, or an inventor, that Ericsson has so curious a project in hand, a smile of incredulity is the reply.

The millions of London, and the king on his throne, alike keep their usual course of varied activity, quite unconscious that a revolution in navigation—an improvement that will be felt around the globe—is in that unslumbering brain, and within the walls of his narrow room.

One day he emerges from his cherished prison with a small, odd-looking boat in his hands. It is the first miniature *propeller*. He wends his way through the streets,

attracting an occasional glance, and the question, "What is that?"

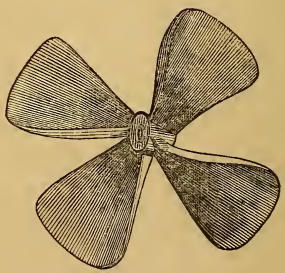
Reaching a large circular bath, he prepares to try this little copy of *bird-motion*. The engine is there—the wheel-work—all but the boiler and steam.

What shall be done? Has the inventor come to see how his toy will look on the water, and push it around with his hand? You do not think *this* of him. Busy hands are at work overhead. Now, there is a steam-boiler on its supports, coming down to a short distance from the surface of the basin. The fire is kindled, and soon the hissing vapor is heard. A pipe connects the boiler with the engine in the boat. Every thing is ready. Captain Ericsson grows somewhat nervous. The moment to demonstrate the value of his discovery has come—the result of his intense study for many long days, is to be tested. Ten thousand hearts would beat with sympathy and suspense, did they know how much for the future of the nations was then and there on trial. The steam is turned on, and down it rushes along the tube to the small piston-cylinder, and then away the model goes around the basin! The frail bark is not two feet in length, and of course can manage only a very trifling amount of steam. And yet it swims through the orbit formed by the rim of the bath, at the rate of *three miles an hour*. Lift your eye to that manly face, and mark how the sunlight of a pure delight breaks over the features just now shaded

with anxiety! The Shakspearian forehead seems to broaden before the relieved and expanding brain. His massive frame grows elastic, and he starts his own living mechanism with a fresh impulse in the walks of useful toil.

"'Tis done!" he exclaims; "the propeller is no longer a theory! it succeeds beyond my hope!" How noiseless the triumph of genius!

Many a victory on a field piled with the mangled dead, and red with blood, which has been sung by a nation, and thundered from a thousand cannon, has been far less sublime and valuable to mankind, than the quiet conquest of thought, celebrated on the margin of a bath in London with a smile and a few words of exultation!



CHAPTER VI.

What is a Propeller?—Building a Ship—The next Toy of genius—The "Flying Devil"—Unwise Great Men—The Excursion—The Disappointment.

I HEAR a voice of inquiry saying, "And how is the propeller made? What is there so very peculiar and valuable about it?" I will try to give you a true and plain answer to this natural and interesting question. To do this, I will begin with the building of a ship.

If you go to a ship yard, the first glance will give you only a bewildering impression of hundreds of busy men—axes and saws in motion—hammers driving home bolts and nails—with here and there a partially-finished hulk surrounded with all sorts of lumber.

There is system and perfect order through all this apparent confusion. Every workman, and each piece of oak and cedar, has a place and purpose.

But how does the stately vessel *grow* out of the materials and labor of the busy manufactory?

Look yonder by the margin of the water, and you will notice a long line of timber laid on blocks, and inclined toward the channel. That is the keel, which extends the whole length of the ship *to be built*. It is double—that is, there is a false keel attached to the first, to be removed in case the vessel gets in shallow water, and thus give it more room. The slope to the shore is for the *launching*.

The next work is setting up the timbers which form the *skeleton*. The curved stem, which is the foundation of the prow, is put in its place. The stem timber follows. One after another, the side parts of different form are adjusted. The keelson, corresponding in its direction with the keel, is run along the ship's length higher in the framework to support the floors, &c. Iron braces to strengthen and bolts to fasten, are added. Along the sides of the ship, at water-mark, runs a shelf. This is a *jutting out* of the vessel's side, on which to rest the covering or woodwork above.

When the structure has reached this stage in its progress, its condition is similar to that of the house after "the raising." The covering and partitions of the floors soon enclose and divide the skeleton, and you have a hulk resembling in shape half of an egg cut lengthwise. The masts, capstan, chocks for running the ropes through to fasten the ship, and other additions, complete the form of the wooden leviathan of the deep.

The hour for the launch arrives. The owners of the finished ship, their friends, and perhaps hundreds of curious spectators, assemble to witness it. The fine structure lies in the ways—*i. e.*, the frame which supports it in its place. The blocks that hold it on the inclined plane are struck out, and with excited people on the deck under waving banners, off the released corsair of the deep moves—slowly for an instant, and then with rapid motion it rushes "stern-foremost" into the tide. How gracefully kissing the water, and then righting again, the creation of genius and skill shoots across the channel or bay! But this is not building a propeller? Yes, until you come to *masts*, or talk of paddle-wheels for a steamer.

Instead of either, a screw-wheel, which an *auger* will make you understand as well, perhaps, as any thing, is laid under the stern, horizontally. That is to say, the position is like that of the auger lying under the ship, with the iron part which enters the handle, connected with the machinery to turn it round. The steam starts the piston, the crank revolves, and right by the rudder or steering apparatus, round the screw goes, the oblique surfaces *propelling* the vessel along. The screw makes two revolutions with every stroke of the piston-rod. This allows a slower motion of the steam-engine, and a quicker one of the wheels in the same time, than in other steamers.

The propeller is very safe on another account. The

machinery for locomotion is, as you perceive, concealed and protected—it is under water. All this which has been described, was in the model. But how shall the ship be built? The inventor has no fortune, but, through the confidence of a few friends, the means are secured for beginning the vessel. It must be small. The keel, which is the longest timber, for a boat forty feet in length, eight feet in width, and to draw three feet of water, is laid. It is to have two propellers, each five feet and a quarter in diameter.

The ship-carpenters are curious to know what sort of a craft this "back-handed" affair will be. Captain Ericsson watches the growth of his little ship with something of the intense feelings he had when the model took shape under his hand, till it was launched in the basin. The flame crackles under the boilers, and their tubes fill with steam. The cable lies coiled on the deck, and the anchor rests unsoiled by the channel's bottom. The engineer's hand is on the lever, the next moment it turns the iron bar; a puff, and off the little steamer starts at the rate of ten miles an hour! Captain Ericsson and his friends are mute with glad surprise at the complete success, with no delay, in the adjustment of machinery. Not a wheel, rod, screw, or any other part of the *harness* of the before unknown form of locomotion had to be touched. Spectators from the bridge and the decks watch the spectre-like navigator, for neither wheels nor paddles are

visible. The old boatmen of the Thames stand with a stare of amazement as the propeller shoots around among the "craft," reminding one of the comet among the stars, it was such a nondescript of naval architecture.

"Hallo there, captain!" shouts a veteran salt; "I've been to sea, and up and down this river, but that sort of craft was never seen before. What do you call her?" The steamer answered with a louder puff, as if enjoying greatly the astonishment. The hands gathered in groups on the boats of the river, gazing and talking about the mysterious visitor. But no explanation could be obtained.

The propeller is next fastened to schooners of one hundred and forty tons burden, *i. e.*, designed to carry that weight; and with ease they were drawn along on the tide, at the rate of seven miles an hour. But look yonder at that stately ship riding at anchor. It could carry two or three of those schooners. The stranger is the American packet Toronto, commanded by Captain Griswold. The fine sailor is ready to spread her canvas, and "stand out to sea." The propeller curves round to her prow, the rope is fastened, and the snorting steamer moves with it into the stream, five miles an hour. The boatmen watch every motion, and try to discover the motive power. But all that can be discerned while the vessel goes at no mean rate against wind and tide, is a foaming rush of water under the stern, and a slender wake, as if a large fish were under, and bearing along on its back, the plain,

substantial hulk. At length a shrewd old salt says, while he looks, "Flying Devil!" The name just suited the superstitious wonder of the boatmen, and by common consent this was the name of the Ericsson propeller—the first in the history of the world!

The excitement attending the advent of the new navigator soon died away, and then came the more important verdict of the London engineers. They eyed the propeller askance, as if it were some "humbug," or, at best, a useless intruder among vessels whose right to the waters was established. The great inventor who had *thought out*, and then wrought out the little steamer, *knew* better. Every part of it was in accordance with natural law. It was a painful surprise and disappointment to him, that others coolly turned away from the creation of his genius, and would consign it to oblivion. It seems strange that the mathematicians and mechanics of the metropolis of Europe, and in all the elements of greatness of the world, should not have discerned what was so clear to him, the fitness of the propeller for ships of war.

His next endeavor in its behalf was to get the subject before the Lords of the British Admiralty. "And what is the admiralty?" a reader asks. When first instituted it was the office of Lord High Admiral. It gave to a nobleman the general superintendence of the royal navy. But afterward six lords were appointed to the same honorable position. There is a Court of Admiralty for the

trial of causes which belong to the naval department. Like all the official business of the British empire, the affairs of the admiralty are conducted in aristocratic style. England has been proud of her navy, until recently the boasted "mistress of the seas." The offices of the admiralty are in the famous Somerset House, to which allusion will be made in the story of Mr. Ericsson's trial of faith and hope with his propeller. It was originally built by Edward Seymour, Duke of Somerset, the Protector under Edward VI., in 1549. I can give you no idea of its magnificence. To erect the noble pile, the duke pulled down several important buildings, and would have demolished a part of Westminster Abbey, could he have had his own way. But the Government restrained his vaulting ambition. The interior was a dazzling display of luxury. But Seymour was an impressive illustration of the words: "Pride goeth before destruction, and a haughty spirit before a fall." He was beheaded for high-treason. In 1775, just as our Revolutionary war with England opened, the Somerset House was partially taken down and built over by the Government, and became the headquarters of its business. In it the monarchy of the empire lives, more truly than in the palace. Because, without its vast and constant work, the crown would be worthless. Here, in apartments almost as elegant as those of Windsor Castle, the Lords of Admiralty meet in their official capacity.

Captain Ericsson succeeded in getting the *half-hearted* attention of these magistrates, only to meet with a new repulse "from that august body." Undaunted still, he resolved on one experiment more, although it would involve him in considerable expense. The plan was, to invite those lords to make an excursion in the admiralty barge in tow of his propeller. He could not doubt the certainty of an order from them to build a war-steamer on the same principle, when once they had scanned its movements more closely. The invitation was accepted. The bright day to nature and to his hopes came. The barge lay before the Somerset House, on the Thames. It was a gorgeous boat covered with gold, and lined with damask. The richness and beauty of it, with the dignity of the half dozen noblemen, would have bewildered a royal parasite, or any ambitious admirer of titled men. But Captain Ericsson cared little for display beyond practical results—the *show of deeds* worthy of the intellect and heart. Look toward the massive steps of the Somerset House. Down them walk Sir Charles Adam, senior lord of the admiralty; Sir William Simonds, chief constructor of the British navy; Sir Edward Parry, the celebrated commander of the second North Pole expedition; Captain Beaufort, the chief of the topographical department of the British admiralty, and several other gentlemen of scientific and naval distinction; and "last though not least," excepting in official rank, Captain John

THE FIRST PROPELLER AND THE ADMIRALTY BARGE, (see p. 78.)

Ericsson. They enter the barge, and the order is given to lash the plain little steamer to the magnificent "floating palace" of the lords. An unseen hand turns a lever, the steam hisses, the screw in the stern of the tug flies round, and away the *Siamese twins*, excepting in the entire want of resemblance to each other, go over the quiet Thames. Now for the great work in hand! Anticipating the severest scrutiny, Captain Ericsson had prepared diagrams of his invention. They exhibited in clear and beautiful outline the new locomotive power on water, and the relation of it to naval vessels for warlike purposes. There the accurate *pictures* lie on the soft damask, simple and yet scientific. The inventor, placing his finger upon them, begins his explanations. Sir Charles Adam and Sir William Simonds, two of the most important personages present, look at the sheets, listen a moment, and glancing at him and then at each other, unmistakably *mean*, if they do not say it—"What of it?"

The keen eye of Ericsson watched the illustrious jury while he continued his earnest plea for the propeller. But each in turn looked *wisely* indifferent, shrugged his shoulders, and shook his head, while in low tone remarks were exchanged, all indicating pretty distinctly the verdict which would be rendered. Neither of the gentlemen in the barge would unkindly wound the sensibilities of the noble Swede; but every one of them was sure he could demonstrate the worthlessness of the invention. The

naval magi of the grandest empire on earth, felt that they were competent to show *him* and the world what *a fool* he had made of himself in this affair. They considerately spared his feelings, any further than the significant tokens of wisdom, and rejection of the uncomplaining stranger puffing away by the side of the barge, were concerned. That stranger, unheeding them, bore the barge along ten miles an hour. Now, through the lofty arches of Southwark Bridge the steamer urged its way, attracting, partly on account of its singular appearance, but more because of the barge, spectators to the decks of the shipping, and to the railing along the arches. Then again the scene changed to London Bridge. Upward to the high roof the smoke curled, and down to the mysterious traveller and the gorgeous display by its side, the wondering eyes of a multitude were turned.

"What do you call that craft without wheels or sails?" inquires a sailor, who saw for the first time the propeller.

"Flying Devil, is all the name I've heard;" replies another who witnessed the feat with the Toronto.

"What makes her go—a spirit, or some Yankee witchcraft from the other side?"

"Well, there's steam you see, and an auger-wheel turns down there under the stern. But how 'tis done you must ask somebody that knows, for I don't."

Exclaims a wag, "Well, that looks like a rough Highlander married to a Princess-Royal, and carrying

her along in his arms." At length the steamer and its charge reached Limehouse, and the steam-engine manufactory of the Messrs. Seward.

The scene changes again, and to an amusing contrast. Their lordships having mentally dismissed from attention the propeller, devote their time to more important matters.

Around the sombre buildings lie finished and unfinished marine engines of different forms. English fashion, they are heavy, cumbrous machines—looking more like "huge piles of ill-shaped cast iron" than mechanism. They were designed for his majesty's steamers, or for uncertain experiments. The learned representatives of the British navy walk over the ample grounds strewn and piled with these common and comparatively unimportant wheels and angular masses, with words of criticism and commendation, from which there was no appeal, excepting to the actual trial of the various contrivances. They pause with peculiar interest and evident delight around the Morgan paddle-wheel—so called from the name of an inventor, who made in this usual method of propelling steamers a decided improvement. The favorite apparatus is observed with prolonged devotion, which declares more emphatically than words could, that Captain Ericsson's submarine screw *had better keep out of the way of those paddle-wheels.*

The lords seemed to expand with conscious greatness, while their admiring looks and expressions said:

"Mr. Swede, you can't tell 'John Bull' any thing which is worth knowing. Just fix your eye on this fitting propelling machine for our ships, if you want to sail them with steam. But we respectfully decline to allow the possibility of a rival in your under-water screw. It would be as sensible and proper to ask us, the British Admiralty, to take the great paddles from their steamers, and fasten under their keel immense *augers*. No, Mr. Ericsson, you mean very well undoubtedly, but you are chimerical—you *are not English*."

The modest inventor could make no other interpretation of the appearance of his party from the time the princely barge left Somerset House up to that moment.

Having surveyed thus leisurely the iron works of the Messrs. Seward, they reëntered the barge, and commenced the return voyage. Captain Ericsson felt less sanguine than when he started, but still hopeful that reflection would work out the desired result. He did not urge the drawings, nor the steamer, on their further notice. The prows cut the foam—the banners waved in the breeze—the barge glittered and *blushed* in the sunlight —and the boatmen stared at the pageant, till the little tug, having done all that was promised, swept with its charge around to the granite edge of the solid wharf near the Somerset House.

The distinguished gentlemen disembarked; and as they parted with the propeller and its inventor, Sir Charles

Adam, with a ludicrously sympathizing manner, took him cordially by the hand, and said: "We thank you, sir, for the trouble you have taken to show us this *interesting* experiment. We fear, sir, that you have incurred too much expense, and given us too much attention on the occasion."

And thus closed the admiralty excursion. Our hero in naval science and labors is *bowed* back again to his tug and his study.

CHAPTER VII.

The sublimely Confident Spirit—The Letter—The Result—The Mystery—Its Solution—The fresh display of Wisdom by the Admiralty—The Engineering Corps—The Swede and his American Friends.

THOUGHTFULLY, and under the shadow of an entirely unexpected neglect, the fine-looking Swede, still in the freshness of mature youth, turns away toward the close of day, with a glance of interest deepened by the indifference of others, toward his anchored steamer, and one of sad annoyance upon the Somerset House, glowing in the light of his expensive holiday. He had relied upon the insight of the educated minds in the Board of British Admiralty. The bills of the excursion were cheerfully paid, for he was still confident that their lordships would appreciate and acknowledge the value of his invention.

With patient hope he waited to hear the result of the "sober second thought."

One day a friend called with a letter in his hand, bearing the official seal of the admiralty. With an excite-

ment of feeling not often occasioned by a similar missive, he broke the envelope. He read on with increasing surprise. With no reasons assigned, the burden of the message was, that the lords of the admiralty were greatly disappointed with the movements of the propeller. Captain Ericsson read the letter again, wondering what it meant. The little steamer had run over the turbid Thames faster than any paddle-wheel boat had done, on so small a scale, obeying perfectly the helm.

The inventor might have been in a fog dark as that so common in London externally, to the present time, had not a mere incident occurred to clear it away. Another friend happened to be present at a dinner where Sir William Simonds, chief contractor of the British navy, who, you recollect, was one of the excursionists in the barge, was also a guest. The conversation naturally turned upon the latest naval novelty. Captain Ericsson's ingenuity and energy were complimented, but—the propeller must prove a failure.

Sir William summed up the case, and rendered the verdict of the admiralty thus:

"Even if the propeller had the power of propelling a vessel, it would be found altogether useless in practice, *because* the power being applied in the *stern* it would be *absolutely impossible* to make the vessel steer."

Oh, oracular Sir William! Though your splendid barge was borne along ten miles an hour, wherever the

governor of the tug listed, and a pleasure ride has been the only opportunity of observation, your wisdom, *impromptu*, sees more than the genius of the Swede could attain in months of almost sleepless study!

The listening company are satisfied, and of course pity the foreigner whose time and money are wasted on chimerical inventions. What a smile of merriment passed around the board sparkling with wine, at the ludicrous idea of steering a vessel whose locomotive power is attached to the stern! When people can walk on their heads, or horses be harnessed to the back part of the wagon, then could the propeller be guided safely over the waters! Nor was the decision of the admiralty the only fatal expression of English indifference toward Captain Ericsson and his propeller. The engineering corps, designed to be the best practical machinists in the realm, were still more emphatic in their condemnation of the new navigator. In private, and in the scientific journals, it was affirmed that the invention was wrong in principle, defective in construction, and so clearly worthless that no sane man would embark in the enterprise.

It really seems all over with the Swede—he must certainly abandon his propeller or England. Do you not think there is something in *perseverance*, even with genius to use it? It has carried the hero of engineering over mountains and seas, and will make a way for success now, though the whole of scientific England is trying to crush him.

Captain Ericsson had not forgotten that Britain had a daughter who had set up for herself across the Atlantic, quite equal to the mother in vigor and activity of thought. Indeed, it is doubtful whether the first propeller would have been built, had not a liberal American, representing for several years the United States as consul at Liverpool—Francis B. Ogden, Esq., appreciated the genius of Ericsson. He was one of the few friends who joined him in his experiment, and his name was borne by the craft when she glided from her ways into the Thames.

Mr. Ogden was widely known and respected for his gentlemanly and generous character, ever ready to encourage worthy enterprises. He was also an inventor in the applications of steam to locomotion. Should you happen to see and examine marine engines having "right angular cranks," the engineer, if an intelligent man, will tell you this form originated with Mr. Ogden. He was a pioneer in the navigation of the Ohio and Mississippi Rivers, by steaming up their currents, and in the grander transit over the ocean—"the world of waters"—without sails or oars.

Even now the work of the great foreigner might have stopped or been greatly delayed, but for another gifted visitor from the new Republic—Captain R. F. Stockton of the Navy, since Commodore. He had for several years given the attention of his enthusiastic mind to gunnery and steam-engines. His grandfather was a signer

of the Declaration of Independence. He was with Commodore Rodgers, of the *President*, in the last war with England, and afterward with Commodore Decatur in the war upon the piratical Algerines; still later, he went to Africa in behalf of the colonization society, and secured, by treaty, the territory on which was founded the Republic of Liberia.

We cannot follow this popular officer through his eventful career, but I will give you, in a few words, a lesson of the greatest worth to all the young, from his remarkable history: "During his whole period of service, he never refused or declined to obey a single order of the Navy Department, nor did he ever ask to have any order modified or withdrawn, but always promptly obeyed, whatever might be the personal sacrifice; nor was he, in one single instance, ever reprimanded by a superior in rank, or subjected to a court-martial for any acts official or otherwise." Captain Stockton, who had devoted much time and enthusiasm to gunnery and steam-engines, was in London while the *Francis B. Ogden* was running up and down the Thames to the people's wonder, and the cool contempt of the British engineers and Board of Admiralty.

"Captain Stockton, give me the pleasure of your company in an excursion on my propeller," said Ericsson to him one day.

The invitation was accepted. And now watch the

little steamer pushing out on the Thames, with no gorgeous barge, and no dignified lords to sit in judgment on the invention. Captain Stockton walks from bow to stern, looks down upon the *quiet wake* behind, and then goes below to inspect the machinery.

His quick and discerning mind sees at once the *reality* of the new motive power. There was to him a revolution in naval warfare in the *revolutions* of that curious fan-like wheel at the end of the vessel. Before the propeller could get from London Bridge to Greenwich, he *ordered Captain Ericsson to build two iron boats* for the United States on the same plan. Bold act for a "Yankee" in the face of six noblemen and several times as many engineers!

Hear his manly words: "I do not want the opinions of your scientific men; what I have seen this day, satisfies me."

How the face of the inventor brightened while speech so different from that in the gay barge fell on his ears. The propeller is moored at Greenwich, and the company proceed to a sumptuous dinner. At the table Captain Stockton makes a fine address; his remarkably clear voice ringing like a clarion with enthusiastic predictions of the future glory of the invention. Turning to Captain Ericsson, he said: "We'll make your name *ring* on the Delaware, as soon as we get the propeller there."

The earnest and decided Stockton fortunately was

rich; for he had to build the steamers on his own account. Then he tried to interest our Government in the great invention. He expended large sums in getting plans and models for the Naval Department at Washington, to convince them of the value of the propeller for ships of war.

Such was his ardor, and assurance of national patronage, that Captain Ericsson threw up all his engagements in England by an honorable arrangement, and started for America in the British Queen, in 1839—his third, and we may believe, his final earthly home.

CHAPTER VIII.

Captain Stockton and the Naval Department of the United States—The new War-Vessel—The Privateer in New York Bay—The Race—The marvels of the Victor.

CAPTAIN STOCKTON urged the Navy Department to keep up with other nations in the march of improvement on the ocean—to get ready for the hour of trial of strength again, on the war-plain of waters.

But he found some of the self-conceit and pride in regard to novelties, which had tested the patience and hope of the Swede in England. Wise captains and officials at the capitol were sure nothing could take the place of sails in traversing the deep.

At length, in 1841, Captain Stockton was permitted by the Government to construct a steam ship-of-war. We had not then in this country any steam vessels in the navy. England had spent immense sums in trying to use the paddle-wheels, but with no permanent success for

the fiery work of battle. The building of the war-steamer went slowly on for nearly two years. No parent ever watched the progress of a child, or artist his growing and fascinating work, with more intense and loving care, than Captain Ericsson did the rising structure, and its equipment for sea-service. Day after day, week after week, he issued his orders, and saw them carried out in his first American war-steamer, on the exact plan which had been rejected by the English Admiralty. He was soon to show the world which of the two parties, that naval court or himself, was wise. The vessel was launched, at length, on the Delaware, at Philadelphia, and at once awakened the deepest interest.

The autumnal sun of October 20, 1843, had passed the meridian, and lay in mellow radiance upon New York City and bay, when the human tides went surging down Broadway toward the Battery. It needed no other evidence that some unusual spectacle was anticipated by the multitude. Have you been in the great metropolis on a similar occasion? Then you will not forget it. How the throngs of all ages, colors, and conditions in life, pour into the grand thoroughfare from the streets crossing it, making the compact lines on the sidewalks, between which omnibuses and carriages of every kind are passing, look, from the elevation in the street near Union Square, or any commanding position, like moving anacondas miles in length, in motion through every part! If the display brings out

the military companies and the banners, an exciting and magnificent sight is presented.

On this October afternoon it was no civic or martial holiday, but a steam-*regatta* on a small scale—a race between two ships—which kept the stream of humanity sweeping down the great channel of life, till the piers, and all standing places which afforded a fair view of the harbor, were lined and covered with people. The eager multitude are gazing up and down the bay. Suddenly that noble steamer, the Great Western, whose first departure from our harbor a few years before, attracted a greater throng if possible, comes in sight. It was then the finest specimen of naval architecture on the ocean. It was built by England, and admired as the wonder of steam navigation in its speed, beauty, and security. No better engines were carried by any ship, while its canvas-wings were large, and moved around tall and substantial masts.

The city was moved by the departure of this model "floating-palace," and crowded the wharves to see it glide gracefully into the waters that washed the distant shores of England. That scene was not forgotten. Majestically now the Great Western moves toward the Battery. The volume of smoke rises darkly from the fiery heart below, and with clouds of steam half mantle the ship from view. The wheels revolve with unusual rapidity, and every sail is set. The white foam rolls

away shoreward, like a billowy snow-drift parted by the rushing locomotive. It was a grand march of the ocean leviathan through the waters. Now she is passing the Battery, and "hurrah! hurrah!!" makes the "welkin ring again." How proudly the good ship flings out her defiance of competition in the spray that rises in showers from her prow!

The shouts of the multitude endorse the challenge. Away she moves swiftly and gracefully, a fourth of a mile from Castle Garden, when ten thousand eyes are turned toward the North River. What is that frigate-like ship, beautiful in outline, riding down against the tide? No columns of smoke, no jets of steam, no paddle-wheels or sails are visible. A model of naval architecture, like a spirit the strange competitor in the race glides right onward toward the Great Western. Fresh volumes of smoke, and whiter clouds of steam, wrap this queen of our seas, and revolving wheels, spray, and foam, reveal the panting haste to elude the new rival to her supremacy. Steadily gaining, the singular craft reaches and passes the Great Western. Not content with this victory, a circle around her is swept, and again she is left behind. The successful racer is the war steamer PRINCETON, whose engine of motion is ERICSSON'S Propeller. Commercial and marine speculators, who just now laughed at the stranger, begin to disparage the favorite paddle-wheel, and speak with respect of the victorious Princeton. How

unwieldy and exposed in her machinery is the Great Western compared with the propeller!

Mr. Mallory, of Florida, declared in the Senate of the United States, years afterward, that the "Princeton was the foundation of the present steam-marine of the world. And hereafter to send sail vessels into naval war service, was to have them captured."

Having looked at the Princeton afloat, and winning the day in the chase, let us go aboard and examine the interior arrangements which shed lustre on the inventor's name. The spiral plates at the end of the revolving shaft, which have the bird-wing motion, and are *under* the vessel's stern, are made of "composition metal." This is resorted to, because the copper bottom of the ship, acted upon by salt water, gives out a galvanic force which *corrodes* iron, a process of decay that would soon render the machinery useless. Next above this cylinder and its wings, on the *other side* of the ship's bottom, we have an entirely new form of steam engine to move them. The "old-fashioned" boiler and the machinery connected with it, could not be placed *below* the water-line; that is, lower than the part of the vessel seen above the surface of the water. It was a thing unheard of till then. When you sit on the deck of a paddle-wheel steamer, you can hear and feel the hot pipes from the boiler, and even watch the engine's motion. In the Princeton this you could not do. The whole motive power was beneath every thing but the

partition which kept out the flood—the walls between the iron-harness of the steam and the deep.

Captain Ericsson had invented and built an engine, so small, powerful, symmetrical, and exact, that it could be put in very narrow quarters, and "work like a charm." He obtained a patent for it in England and America. Its name is the "semi-cylindrical engine," because of the form of the cylinders. They are not round as in other engines, but half-circles. The piston-strokes, which you have observed and heard in steamers, up and down *vertically*, have a pendulum motion, in a horizontal direction. The piston-rods vibrate somewhat as the ordinary ones would if the cylinders were laid lengthwise on the deck. Unless you have studied the steam-engine thoroughly, and have seen this beautiful creation of genius, you cannot understand or appreciate the novelty and value of it. It required only *one-eighth* of the room occupied by a British marine engine of the same power, and weighed less than half as much. And then, far less machinery was required, while greater power was obtained. Did you notice outside that there is no tall smoke pipe, rising like an iron chimney, to make a *draft* to kindle the fire and keep it burning? Would you like to know why? Examine more closely the inside work and you will observe a curious contrivance, resembling wind-mills, whose fans revolve very swiftly when the steam "is up." These *humming* wheels with their frames are called "*blowers.*"

They are in the bottom of the ship, and throw in a current of air upon the furnaces so strong, that the height of the pipe is of small importance. It is not more than five feet high, and even if blown or shot away, the fires would still burn. You will now find these blowers on all the steamers using anthracite coal. You cannot well avoid noticing them on the promenade decks of common river steamers using the coal. In finishing and furnishing the Princeton for fighting on the sea, the genius of Stockton and that of Ericsson were both employed, the two inventors working like brothers together. The former believed that larger cannon than any before used could be made of wrought instead of cast-iron; that is, fashioned by machinery and hammers, instead of run, when the iron is melted, into a mould. He had two great guns manufactured, one in England weighing *seven tons*, the other was forged by Ward & Co., of the Phœnix Foundry, New York, and weighed *ten tons*. The bore of the latter is twelve inches in diameter, and it carried a ball of two hundred and thirteen pounds weight.

The next question was how to manage on the ship's deck such immense instruments of death and destruction. The exhaustless brain which conceived the propeller, and the wonderful engine of the Princeton, answered that interrogation. A new gun-carriage was soon invented and ready, which would control the tremendous recoil, or

bound backward, when the charge rushed forth with its thunder-peal. Not only so, but with this carriage a few men could handle the massive iron tubes with ease. It was also made of wrought iron. Besides this remarkable mechanism, he contrived a curious lock, with which the *law of gravitation and the rolling of the sea* would discharge the gun without a human hand.

In 1828 he showed it to Sir Henry Vane, at the head of the British Ordnance Department, but he would not test it unless a number of officers could be appointed to sit with him in the examination; and as that would let the secret out, Captain Ericsson preferred to *lock up* the lock in his safe. Captain Stockton was again wiser than the lords of England, and *saw something* in the invention. Nor did the Swede stop here. He gave to his friend, and to the world, an instrument for getting in a few seconds any distance at sea, from four hundred and fifty to four thousand yards.

You will readily understand, my young reader, that for only a little way can a gun be fired direct, or in a straight line; because allowances must be made for gravitation drawing the ball down toward the earth. To remedy this, when an object is distant, to hit it, the cannon must be *elevated*, to make allowance for the falling motion. It is, of course, important to know exactly how far off the ship or fort on the shore is, to aim right. Up to that time various contrivances had been employed, but

none were accurate. Captain Ericsson produced just the beautiful and correct instrument for the valuable service of the gunner. It tires one's brain to think of such ceaseless work of another's thought.

L. of C.

CHAPTER IX.

What Captain Stockton says of the Ship—The Mysterious Warrior—The Peaceful Work of the Propeller—What it is doing now.

ALTHOUGH you cannot remember the enthusiasm awakened wherever the Princeton was seen, you will read with interest the captain's description of his *toy*, written in the unsoiled cabin, twenty years ago. I forgot to tell you the name of the vessel was given in honor of his home then, and now, in the summer time, the capital of New Jersey.

The following letter of Captain Stockton, descriptive of his noble ship, will be read with interest; although none of my readers can remember the sensation produced by the Princeton on her first appearance in our waters:

"UNITED STATES SHIP PRINCETON,
PHILADEPHIA, February 5, 1844.

"SIR:—The United States ship Princeton having received her armament on board, and being nearly ready for sea, I have the honor to transmit to you the following account of her equipment, &c.:

"The Princeton is a 'full-rigged ship,' of great speed and power, able to perform any service that can be expected from a ship-of-war. Constructed upon the most approved principles of naval architecture, she is believed to be at least equal to any ship of her class *with her sails*. She has an auxiliary power of steam, and can make greater speed than any sea-going steamer or other vessel heretofore built. Her engines lie snug in the bottom of the vessel, out of reach of an enemy's shot, and do not at all interfere with the use of the sails, but can at any time be made auxiliary thereto. She shows no chimney and makes no smoke, and there is nothing in her external appearance to indicate that she is propelled by steam.

"The advantages of the Princeton over both sailing-ships and steamers, propelled in the usual way, are great and obvious. She can go in and out of port at pleasure, without regard to the force or direction of the wind or tide, or the thickness of the ice. She can ride safely with her anchors in the most open roadstead, and may lie to in the severest gale of wind with safety. She can not only save herself, but will be able to tow a squadron from the dangers of a lee shore. Using ordinarily the power of the wind, and reserving her fuel for emergencies, she can remain at sea the same length of time as other sailing-ships. Making no noise, smoke, or agitation of the water (and, if she chooses, showing no sail), she can surprise an enemy. She can at pleasure take her own position

and her own distance from the enemy. Her engines and water-wheel being below the surface of the water, safe from an enemy's shot, she is in no danger of being disabled, even if her masts should be destroyed. She will not be at a daily expense for fuel, as other steamships are. The engines being seldom used, will probably outlast two such ships. These advantages make the Princeton, in my opinion, the cheapest, fastest, and most certain ship-of-war in the world. The equipments of this ship are of the plainest and most substantial kind—the furniture of the cabins being made of white pine boards, painted white, with mahogany chairs, table, and side-board, and an American-manufactured oil-cloth on the floor. To economize room, and that the ship may be better ventilated, curtains of American-manufactured linen are substituted for the usual and more cumbrous and expensive wooden bulkheads, by which arrangement the apartments of the men and officers may in an instant be thrown into one, and a degree of spaciousness and comfort is attained unusual in a ship of her class. The Princeton is armed with two long 225-pound wrought-iron guns and twelve 42-pound carronades, all of which may be used at once on either side of the ship. She can consequently throw a greater weight of metal at one broadside than most frigates. The big guns of the Princeton can be fired with an effect terrific and almost incredible, and with a certainty heretofore unknown. The extraordinary effects

of the shot were proved by firing at a target, which was made to represent a section of the two sides and deck of a seventy-four-gun ship, and timbered, kneed, planked, and bolted in the same manner. This target was five hundred and sixty yards from the gun. With the smaller charges of powder the shot passed through these immense masses of timber (being fifty-seven inches thick), tearing it away and splintering it for several feet on each side, and covering the whole surface of the ground for a hundred yards' square with fragments of wood and iron. The accuracy with which these guns throw their immense shot (which are three feet in circumference), may be judged by this: that six shot fired in succession at the same elevation struck the same horizontal plank in a target more than half a mile distant. With Ericsson's fine instrument for the purpose, the remoteness of any object may be ascertained by an observation which it takes but an instant to make. By self-acting locks, the guns can be fired accurately at the necessary elevation, no matter what the motion of the ship may be. It is confidently believed that this small ship will be able to battle with any vessel, however large, if she is not invincible against any foe. The improvements in the art of war adopted on board the Princeton, may be productive of more important results than any thing that has occurred since the invention of gunpowder. The boasted greatness of other navies may be set at naught. The ocean may again become neutral

ground, and the rights of the smallest as well as the greatest nations may once more be respected.

"All of which for the honor and defence of every inch of our territory, is most respectfully submitted to the honorable Secretary of the Navy, for the information of the President and Congress of the United States,

"By your obedient and faithful friend,

"R. F. STOCKTON,

"*Captain U. S. Navy.*

"To Hon. DAVID HENSHAW,

"*Secretary of the Navy.*"

In the proud navy of the British Empire, and in that of France, there was no fiery-hearted leviathan that could equal the Princeton in speed, beauty, and security. And then almost *smokeless*, the warrior marched over the waters —and at night the pathway was noiseless, giving an enemy, by neither signal common to other steamers, any warning of the approach of the formidable foe.

To a great degree independent of winds and waves, and shot, on the waste of waters, it is not strange that the world watched and wondered, while this solitary corsair, of the kind, seemed to be the monarch of the seas—the giant destined to wrest the sceptre from fabled Neptune's hand, and defy the fleets of the world.

"But is the propeller good only for warfare?" you may ask, unless you have travelled by steam, or live on

the green banks of some river, or on the shore of old ocean. Its triumphs are greater as a peacemaker than *fighter*. Hitherto it had been difficult to use wind and steam—or, in other words, to make sails and paddle-wheels work together. For, when a nice breeze came freshly against the canvas, the vessel would careen or turn sidewise, lifting one of the wheels entirely or partially from the water; and like a broken-winged bird, the ship was off balance.

But the propeller does not mind Boreas at all. Let the vessel lie on one end, unless standing on its *prow*, or lie on either side, and the spiral plates away under the stern revolve and push the freighted craft through the foam. If fuel is low, the captain has only to shut off steam, touch a lever, and release the propelling part, letting it whirl idly around. Then it does not affect, to any extent, the speed of the ship under the outspread canvas wings.

If the fan-shaped wheel were fast to the engine, and drawn thus through the water, you will perceive, upon a moment's reflection, that it would seriously retard the progress of a ship when it was not in use. And now all seas and rivers are *bored* by these "screw steamers." I allude to the "tugs." Ships great and small are traversing the waters borne safely and rapidly along by the power God first gave to birds and fishes; and which, when learned by a single man, was rejected by others in high places of

royalty. How wonderfully the Lord and Redeemer of the race, in his providence, leads the human mind and sight to *his* stores of knowledge and wealth! The compass, printing, steam, coal mines, and now oil wells, show us how wisely he adapts discovery and invention to the education of the world, and its preparation for a promised millennium.

CHAPTER X.

The Congressional Excursion on board the Princeton—The Captain and his Ship—Coronation Dinner—The Second Excursion—The Terrible Accident—The Cause of it.

ON the twentieth day of February, 1844, the Princeton was a *floating hall of Congress*. The novel and magnificently-armed war-ship was full of social life under the flying banners of our country. I will give you glimpses of the scenes of that memorable excursion, from the pen of one of the favored party; because it will make the almost forgotten and romantic incident seem like an exciting pageant of the present:

"WASHINGTON, Tuesday, February 20, 1844.

"When the Queen of Sheba visited King Solomon, who, it is said, was somewhat partial to ladies, she declared upon her sacred honor that not the half had been told her of the power and glory and gallantry of the illustrious philosopher-king, the mighty successor of the min-

strel monarch of the golden city of Zion; so it is impossible to tell you the half that we saw and heard and enjoyed in the excursion given to the House of Representatives by Captain Stockton, of the steam frigate Princeton, this day.

"The morning was propitious, auspicious, and tolerably delicious. The atmosphere, it is true, was rather misty and overclouded, but the wind was from the right quarter, the golden angel upon the steeple of the Rev. O. B. Brown's church held her trumpet steadfastly to the south. At half-past ten, in company with two of our representatives, Messrs. Morris and McCauslen, of the House, we set out on foot for Greenlief's Point, at the southern extremity of the city, distant about two miles; but the mud was impassable, and so we accepted the offer of a passing hackman and rode it.

"Arrived at the landing, we discovered the Princeton, with her graceful keel, her tall and tapering spars, lying but a mile off in the stream. Several boats and a 'broadhorn' were kept flying to and fro between ship and shore for nearly an hour, in the transportation of the party.

"The marines were discovered drawn up in line on the upper deck as we mounted through the porthole. When the whole company of visitors were aboard (some three hundred persons) the ship was put in motion by her invisible and almost noiseless machinery in the hold. We found the Princeton armed with twelve 42-pounders

and two tremendous pieces of ten tons weight each of wrought iron, carrying a ball of two hundred and thirty pounds for two miles with the precision of a rifle, all on the upper deck. The two great guns are fixed at the bow and stern of the ship, and are called the 'Peacemaker' and the 'Oregon.' These two 'bursters' are as bright as Aunt Peggy's pewter plates on Saturday evening, shining all in a row on the top shelf of the kitchen-cupboard. When the ship was fairly under way, Captain Stockton, mounting one of the guns, said: 'Now, gentlemen of the House of Reprcsentatives, fellow-citizens, and shipmates, we are going to give a salute to the wisdom of this mighty republic (God bless her!) in Congress assembled. Stand firm and you will see how it feels!' In rapid succession the pieces were fired, the ship thrilling and the distant hills reverberating with the thunder peals. The instantaneous combustion of forty pounds of gunpowder in a discharge from the 'Peacemaker' closed the round of twenty-six guns. The deck of the ship was enveloped in smoke. We came near falling over the venerable ex-President Adams in the momentary darkness. Captain Stockton's voice rose high amid the din of battle. 'It's nothing but honest gunpowder, gentlemen; it has a strong smell of the Declaration of Independence, but it's none the worse for that. That's the kind of music when negotiations fail. It has a little ring of the earthquake, but it tells handsomely on salt water.'

"In due season the deputation of visitation were called to dinner in the cabin on the middle deck, extending the whole length of the ship. It was a feast of substantials and delicacies worthy the coronation-day of a South American emperor. Ducks and chickens, turkeys and hams, beef *à-la-mode*, partridges, &c.; ice creams, oranges, apples, raisins, almonds, &c.

"The ship passed below Alexandria, till the hill of Mount Vernon and the sacred residence of Washington loomed into view on the right, and the frowning battlements of Fort Washington on the left, when she turned about and returned. Several experimental shots were made from the 'Peacemaker' during the trip; and those solid balls of two hundred and thirty pounds skimmed the surface of the water for several miles with the lightness of an arrow.

"The utter astonishment and amazement which she created among the inhabitants upon the banks of the river is not easily conceived, as they behold this fairy phantom-ship, without a patch of sail spread upon her spars, or a living soul upon her decks—without the slight evidence of steam, fire, light, or life, on board, still ploughing her onward way through the immense thickness of ice, ripping, tearing, breaking, crushing it with irresistible power—*mirabile dictu!* The Messrs. Harpers will please issue proposals for a new edition of the 'Arabian Nights,' and Irving must retouch his legends of the 'Flying Dutch-

man;' for the age of romance is come again. To-day the captain invigorates, advises, and prepares; and to-morrow the President and *suite*—a private party—will visit the Princeton. It will be a select party."

A week later, the war-propeller was again the scene of display and festivity, and also of awfullest tragedy. A spectator gave a sketch of the excursion and its thrilling events, which have an impressive lesson of life's frailty, and God's power and nearness to us all:

"On the 28th of February the President, Cabinet, and a large number of members of Congress and distinguished strangers in Washington, went on board the Princeton for an experimental excursion. The beauty and the chivalry of the United States assembled at the seat of Government were also present. A more gay, joyous, or delighted company seldom before were ever gathered together on the deck of any one of our national ships. It was a beautiful, bright day, and the resplendent sun blazed upon the firmament without a cloud to threaten his effulgence. The Potomac was unruffled by a breeze, its glassy surface presenting the lustre and serenity of a perfect mirror. As the Princeton, without the aid of wind or current, smoothly pursued her way as if moved by some unseen agency, no cloud of smoke marked her progress, no uncouth sounds of jarring machinery, min gled with the voice of festivity which rose in pleasant harmony from the deck of the gallant vessel. There

were grave matrons, mothers of the naval and army heroes of the country; there were illustrious senators and curious statesmen; and there were youth and beauty, light hearted and joyous. There, too, were gallant post-captains, generals, distinguished engineers, and men of science, come to feast their eyes upon this nautical wonder, this gem of the ocean, this last effort of American genius, skill, and architectural ingenuity.

"It is not possible to suppose that the heart of the gallant commander did not throb with patriotic exultation, or that he did not consider all his risks in past years, his toils, his hardships, the sneers of enemies and the derision of the ignorant, more than compensated by the universal homage which rewarded success. He had attained the goal of his hopes for the navy and for his country; yet from the lofty height of honorable exultation, in a single instant with the flash of a gun, he was plunged into woe unutterable, and prostrated to the earth with the groans of the dying, and the lamentations of the living, falling on his ear, and breaking his heart.

"During her progress down the Potomac, the great guns on the Princeton had been again and again discharged, until public curiosity appeared to be satiated. The company had retired below, and at the festive board the voice of hilarity resounded through the decks of the proud ship. Toasts were given appropriate to the occa-

sion, and all went merry as marriage-bells. The feast of reason and flow of soul was nearly spent.

"Some of the guests had commenced retiring from the board and renewing their scrutiny on the different parts of the ship. Captain Stockton had risen to offer a toast complimentary to the Chief Magistrate of the republic. As he rose, with his wine-glass filled in his hand, an officer entered and informed him that some of the company desired one of the great guns to be again discharged. Captain Stockton shook his head, and saying, "No more guns to-night," dismissed the officer. He soon again returned, while Captain Stockton was speaking on the subject of his toast, with a message from the Secretary of the Navy expressive of his desire to see one of the big guns fired once more. This message Captain Stockton considered equivalent to an order, and immediately went on deck to obey it. He placed himself upon the breech of the gun, aimed, and fired. Feeling a sensible shock, stunned and enveloped in a cloud of smoke, for an instant he could not account for his sensations. But, in a few seconds, as the smoke cleared, and the groans of the wounded and the shrieks of the bystanders who were unhurt resounded over the decks, the terrible catastrophe which had happened was revealed. But in that appalling hour when other men would have been paralyzed, he, of of all the crowd around, seemed to have clear thought and self-possession. He was severely hurt, yet calmly and

distinctly his voice pealed over the elements of confusion; a few brief orders, recalling his men to a sense of duty, were given; the dead and wounded were ascertained, and properly cared for; when, as he turned to leave the sad scene, he fell exhausted in the arms of his men, and was borne insensible to his bed.

"The unfortunate sufferers by the explosion who were killed were the Hon. Abel P. Upshur, Secretary of State; the Hon. Thomas W. Gilmer, Secretary of the Navy; Captain Beverly Kennon, U. S. Navy; Hon. Virgil Moxey, of Maryland; and the Hon. David Gardiner, father-in-law of the President."

I shall always carry the impression of that fearful day. The tidings went over the land like the shadow of an eclipse. Not because life was more precious in itself to the distinguished men thus suddenly summoned to eternity; but not often does a fatal accident strike so heavily upon the honored in a nation's high places of power.

A naval court of inquiry attached no blame either to Captain Ericsson or Commander Stockton. The gun and its firing seem to have been on scientific principles. The accident was one of those providential bolts that fall from a clear sky, crushing human hearts and hopes. They come down everywhere, and no skill or care of man can ward them off. They teach us the folly of our wisdom before Him "who touches the hills and they melt," and

that he is no respecter of persons; enforcing the Redeemer's words, "Be ye also ready."

Such scenes as crimsoned the Princeton's deck echo those words of song:

"And like yon sea is human life;
Events like billows roll;
Moment on moment, strife on strife,
That change us to the soul;
And joys like autumn leaves fall fast;
Hope sets—and being's light is past."

CHAPTER XI.

A new Field of Invention—The Wakeful and Working Genius taught afresh by the Divine Law in Nature—The Caloric Engine—The Wise Men of England again—The Present and Future of Motive Powers—The Propeller is a success!

I HAVE watched on the broad Delaware with great interest while writing this, the "steam-tugs" almost hourly puffing along, drawing in their wake the noble ship, or a score of canal boats, forming a train for a good distance behind them. Who that knew the history of Ericsson could fail to think of his toy in the bath, and of the "Flying Devil" on the Thames?

We will leave the humble yet mighty power in peace and war, girdling the globe, and follow the great genius of the cold north in his next sublime effort. Not only had he watched the birds and fishes, and learned splendid lessons from those unconscious teachers, but he had studied nature in her manifold operations, and had found deep meaning in Bryant's poetical language:

"To him who in the love of Nature holds
Communion with her grandest forms,
She speaks a various language."

Let us go with him to Niagara Falls. Standing on Table Rock, we gaze awhile upon the rushing, foaming, thundering flood, bewildered and awed by the grandeur of the scene. A rainbow arches the brow of this *American Cataract*, and a white cloud of incense ascends perpetually from his altar. Compared with his European brother, around whose domain the Grand Canal rises on the mountain-side, his home is a world of itself.

How inexpressible and mingled the emotions as you look and listen! Down the river, on the bank, you can see the spot where a beautiful young lady, leaning over the brink to pluck a lovely flower, lost her balance and went down a hundred feet to the rocks below. She was taken thence to the hotel to gasp and die. In sadly musing mood you think of the shipwreck for two worlds made every day by just such endeavor to pluck a dangerous and momentary pleasure.

But turning to the inventive genius near, while not insensible to the magnificence of the unrivalled cataract, he is deeply absorbed in certain practical *suggestions* made to him by the falls. Comprehensive and startling are his calculations. He will tell you that the amount of water in that descending sheet is twenty-eight thousand tons every second of time. That is, nearly three and a

half billions of pounds go over the precipice, one hundred and fifty feet high, each minute. This is equal to five hundred trillions of pounds in a minute, through the distance of one foot. Now, apply a simple rule of arithmetic, division, and ascertain how many times thirty-three thousand, which is the number of pounds it is estimated that a single horse can draw a foot in a minute, is contained in that vast sum, and the answer will be, *fifteen millions;* in other words, the *water-power* of Niagara Falls is equal to the strength of fifteen millions of horses, and that unceasingly. But the St. Lawrence has a great deal of descent and power besides the cataract. To make by *steam* the same amount of engine force, would require annually *three hundred millions of tons of coal.* For to create power by steam as great as that of a horse, would consume twenty tons of coal every year. Think of this tremendous force at work night and day! Then think of all the rivers and smaller streams, with their descending flow and waterfall, from the Tröllhattan of Sweden to the Niagara of America, and what "a stupendous force is here exhibited!" So far as mechanical use is concerned, it is almost a waste. And yet nature moves on, never resting, never failing! The tremendous forces are somehow fed with new strength continually, and in this sense are a perpetual motion. But Captain Ericsson went further in his curious calculations. He made an estimate of power in ANIMATE creation. That is, the

strength put forth by animals, including man physically.

And how do you suppose he got at such a calculation? He began with *man*. It is found that he can exert power which would raise fifty pounds a hundred feet every minute for eight hours out of the twenty-four. To make it plain, any person of ordinary strength has force enough to lift that amount daily for one-third of the time. Of course all people cannot do it, but this is the average. Do you recollect the estimated population of the globe? It is believed to be a billion. According to the calculation, then, the human beings of the earth have a force equal to thirty millions horse power. In other words, a billion of persons exert the power of thirty millions of horses! Captain Ericsson, without being able to number all the animals and estimate their power, concluded he might safely put down quadrupeds as equal in force to mankind; and the inhabitants of the sea, beginning with the whale, often possessing the force of twenty horses, greater still. To sum up the novel and yet grand estimate of force, he called the united power of all animate beings, more than equivalent to an engine of one hundred million horse power. You know Archimedes the great mechanician said, that if he had a fulcrum, or point outside of the globe for his lever, he *could lift it*—so mighty were the means of raising weights invented and employed by him. Captain Ericsson says, if he could build an engine large enough to wield a

force equal to that of the living creatures in the world, it would have one hundred millions horse power! Supposing the tremendous engine built, how much *coal* would it need to feed its fires? An engine of one horse power requires twenty tons of anthracite a year. Therefore, *two thousand millions of tons* annually would be consumed by the mammoth steam-power. In a hundred years it would exhaust a bed of coal three thousand square miles, a hundred feet thick. And yet Captain Ericsson saw, as we can see, that nature does a vaster work, is unceasingly using her forces without change, and with no supply of power out of herself. The river murmurs down its channel, or thunders over a battlement of rock; men and animals continually exert force, and draw ever fresh supplies with no *outside* means of renewal, and without waste. These curious and interesting facts in the material creation, suggested the next wonder of his unresting intellect, the CALORIC ENGINE.

I think, with a little attention, my young reader will get a correct idea of this invention, a marvellous and beautiful thing indeed. The foundation principle is, to use the *atmosphere* instead of steam, and make the heat expanding it under the pistons, do its work over and over again. You know that the heat which turns the water to steam, in each volume of it passes off with the vapor. Therefore the fires must be kept fiercely burning. Captain Ericsson could not see why this waste should not be

avoided, and as elsewhere, nature save her forces, and the engine more nearly resemble the falling river, or active animal form taking care of, and using the means of exerting power. If so, then a fire, for which an amount of fuel so exceedingly small would be needed, that it could be found *anywhere*, would keep a large engine in motion. For, kindle a flame in the caloric engine, and the expanded air *pushes* the piston up and down as the steam does; while, by an ingenious apparatus called the *regenerator*, that coloric is sent back to *push again*. The only loss must be the trifling amount of heat which passes off, or is radiated during the time it is travelling about to do its work. There is no wearing out of the caloric, no change by using it. It had been, and is wasted by steam power. And this, as I have intimated, demands the immense quantities of fuel which keep the furnaces in blast under the boilers. In the low-pressure engine, the steam, after forcing up the piston, is turned into a condensing apparatus, which makes water of it again, and down the piston rushes through the cylinder to be lifted again. Plainly, the heat which expanded the volume of steam, goes with it into the water. The high-pressure engine has no condenser, but the steam pushes both ways, and is let off into the atmosphere, carrying the caloric with it. Thus the heat cannot be returned with steam-power, but the fires must furnish a new supply. In the permanent gases, that is, those that keep their form like the air, how

clear it is that the heat in any volume of it can be moved about with it, until by a gradually cooling process it is thrown off and spread over a larger extent of the atmosphere.

"And what did the wise men of England say to the caloric engine?" you inquire.

You can "*guess*" from the experience our engineer had with his propeller.

When, in 1833, after much study and many experiments, he presented the invention to the scientific men of London, all of them excepting the two splendid and leading chemists of the kingdom, Professor Faraday and Dr. Ure, displayed the same wisdom which shed such glory upon the lords of the admiralty! They pronounced the principle of the caloric engine as they did that of the propeller, false, and therefore worthless. Nature and Ericsson were forever under the eclipse of English science. A working engine of five-horse power did not light up the night of condemnation of the invention.

But Sir Richard Phillips, an author well known in the literary world, examined it, and had to confess it did *look* well. He published a Dictionary of the Arts of Life and of Civilization, in which he records of the caloric engine:

"The author has, with inexpressible delight, seen the first model machine of five-horse power at work. With a handful of fuel applied to the very sensible medium of the atmospheric air, he beheld a resulting action in nar

row compass, capable of extension to as great force as ever can be wielded or used by man."

One day Lord Althorp, since Earl Spencer, Secretary of the Home Department, entered the engine-room where the new iron worker was busy—his heart not large but *warm*—his strong arms moving gracefully, and every part adapted to the end designed. With the nobleman there was the venerable Mr. Brunel, the celebrated architect of the Thames Tunnel, which you know is a grand passage-way under the river, and a very magnificent piece of engineering. The home secretary selected him to judge of the caloric engine, because of his knowledge and experience. But sometimes age unfits a person to be impartial in the judgment of a new discovery or invention, there being a prejudice against innovations upon older and familiar things for the same general purpose. Somehow Mr. Brunel had made up his mind that Captain Ericsson's machine was unsound in theory; no matter how finely piston-rod, crank, and wheel might move, there was certainly a defect, even if he couldn't see it.

"The engine works very well, Mr. Brunel," remarked Lord Althorp, as they left the apartment in which the Swede kept his last specimen of mechanism, which had cost him many weeks of profound study.

"Yes, my lord, it has motion, but can never be available in practical mechanics. It is wrong in principle—certainly wrong, my lord."

This sage opinion, adverse to the invention, went to the British Government, and naturally created indifference there. Letters were written by Captain Ericsson to Mr. Brunel, and answered; but in vain the genius of the inventor endeavored to shed its clear light upon the mind of the engineer. He had the true English obstinacy which frequently looks like *stupidity*. The correspondence ceased, and I suppose Mr. Brunel pitied the fancy-inventor, whose comparative youth was an excuse for his failures.

Professor Faraday, the chemist, was more disposed to approve, at least fairly test the caloric engine. One day you might have seen in the "London Times" and in other advertising forms, a notice that the professor would give a "Lecture on the Caloric Engine in the Theatre of the Royal Institution." The hour came, and with it a large and very intelligent audience. The lecturer, and the novel and highly-interesting subject to scientific men, gathered an assemblage of people seldom convened. The noble and the most thoroughly educated were there. I need not assure you that Captain Ericsson was present. The occasion was brilliant, and much was expected from its oracular words. Glance over that spacious and elegant hall, and watch both the intellectual faces of the immense throng, and the company on the platform. There stands a scholar and a fine gentleman, but somehow a little embarrassed. He does not seem quite at home. What can the matter be?

I will tell you. Until half an hour before the many hundreds poured into the theatre, Professor Faraday had intended to explain and defend the wonderful invention of the Swede. But suddenly he discovered, no one knows how, that he was mistaken in his idea of the machine. The expansion of the air is, after all, false in theory, in its application to locomotion. So the learned orator begins:

"*Mr. President, Ladies, and Gentlemen:* Although I have devoted many hours to the study of the caloric engine, I am compelled to inform you at the very outset of my lecture, that *I do not know why* it works at all."

A *luminous* beginning, you will say. The intelligent hearers must have felt their anticipations go down like mercury in a thermometer when exposed to a frosty wind. The chemist, however, confined himself to the Regenerator. This invention, you remember, returns the heat after it is used in the cylinder to move the piston, back again to be applied to the same purpose; in other words, it *renews* the force by saving the coloric which is lost in steam. The eloquent speaker, the "golden-mouthed" lecturer, charmed his audience with the description of this invention, respecting which there could be no doubt or denial.

Besides the misapprehension and indifference of England's great men, there were defects in the engine which

hindered its success. The high degree of heat in the air injured the machinery by a kind of rusting process, which rapidly spoiled the piston's valves, and other parts of the machinery. To remedy the evil, Captain Ericsson went once more to his study.

CHAPTER XII.

The Inventor's Inventions—He is sure of Success with his Caloric Engine—The Improvements—The Brilliant Achievements in America—The Trial-trip—The Engine a Worker Still—Its Future.

A FEW years of comparative quiet in Captain Ericsson's life, follows the grand triumph of the Princeton. But he is not idle. His genius, however, is producing new marine machinery, and adding to the improvements of peaceful mechanism. Nor is his Caloric Engine forgotten.

In 1851 the great Industrial Exhibition of all Nations was held in London. Amid the magnificent and bewildering display of art and invention, in a modest corner, were the following creations of a thinking mind, bearing the name of ERICSSON. The "Distance Instrument," for measuring distances at sea, giving, as no contrivance had ever done before, quickly and accurately the distance of an object from the ship at sea. It was, you will readily understand, especially valuable in gunnery, aiding materially in *taking aim*. It is further explained in its use on

the Princeton. The "Hydrostatic Gauge" is for measuring the volume of fluids when under pressure. The "Reciprocating Fluid Meter" measures the quantity of water which passes through pipes during certain periods. The "Alarm Barometer" gives warning of sudden changes in the weather. The "Pyrometer" is designed to measure temperature from the freezing point of water to the melting heat of iron. The "Rotary Fluid Meter" is constructed on the principle of measuring fluids, as water, by the volocity with which they flow through apertures of definite dimensions. The new "Sea Lead" will give the soundings or depth, without "rounding the vessel to the wind," in the ordinary way, and independently of the length of the line.

Though you may not have a clear idea of the value and use of all these inventions, you will discern the marvellous power of the intellect which produced them, while making Propellers and Caloric Engines, with many other contributions of scientific skill.

For the articles of mechanism mentioned, Captain Ericsson received the prize medal of the Exhibition. In 1852 he was made Knight of the Order of Vasa, by King Oscar of Sweden—a royal honor the now plain republican cared less for than he did for a single success as inventor. Indeed, so busy was he at that very time on the Caloric Engine, he scarcely read the certificate of knighthood.

In February, 1853, again a crowd passed down Broadway, and wound their way through the streets to one of the wharves.

"And what new naval wonder now?" you ask.

There lies gracefully on the water, a vessel of two thousand tons, not very different in general appearance from other ships. But the newspapers had told the people that its engine was worked by *heated air* instead of steam—which the English lords and engineers, you remember, had declared could not be done. Soon a select party are on board, the anchor is lifted, the hot-air turned into the cylinder, and away the vessel glides "out to sea." She is bound for Alexandria, on the Potomac. The heavens become overcast, and the wind tosses the waves. But onward through gale and foam the good bark moves, breathing the atmosphere the passengers do, only a little *warmer;* the iron heart throbbing steadily for seventy-three hours, without pausing to rest a moment. Not a change or adjustment of the machinery is necessary for those three days' sail.

Like the *Francis B. Ogden*, which the Thames boatmen called the "*Flying Devil*," the caloric ship, almost without smoke or sound, walks the waters

"Like a thing of life."

The furnace required only five tons of coal in twenty-four hours—much less than any other ship of the same

size. An eager crowd welcomed the stranger at Alexandria.

Soon afterward, on one of the last days of winter, you might have seen a procession of men headed toward the "ERICSSON." The people come out to see it pass; for the President of the United States, the President-elect, Franklin Pierce, the Cabinet, many naval officers, and members of Congress, form that imposing company. They step on board, go from deck to hold, and after hearty words of congratulation upon the success of the caloric engine, they retire. Then follows a visit from the foreign ministers. The proud Englishman *outwitted* by the Swede, the autocratic Russian, the polite Frenchman, and the dignified German, all admire and wonder, and then depart, musing over the strange things with which the "Yankee nation" is startling the world. A little later, a fine procession of Virginians—the legislature then in session—in a body, proceeded to the extrordinary ship.

The law-makers of the "Old Dominion"—that "mother of Presidents," and the "mother of slaves"—now the central or grand battle-field of the Republic, examined in every part, and were delighted with the beautiful craft. They invited Captain Ericsson, through a committee, to visit Richmond, as the guest of the State.

The Secretary of the Navy recommended to Congress

the passage of a resolution, authorizing him to contract for the building of a frigate of two thousand tons, with caloric engines, costing half a million of dollars. But an unexpected hindrance to the complete revolution in motive power, which many anticipated, arose. The caloric engine was a *slower* iron-horse than the steam-power, and the cost of large engines was too great for private purses. Still what a triumph! The miner-boy of the Wermeland iron mountains, entertaining on shipboard Presidents, the highest officers of the Republic, and the representatives of European monarchies, all admiring the work of his genius; a *working* genius, which for sixteen hours out of twenty-four will bend over the table and throw off diagrams nearly as rapidly as the printer does the sheets from his press.

Captain Ericsson set himself to the business of improvement. He taught the lesson to us all never to be disheartened by failures, and also never to be satisfied short of *perfection*. In study, in every task, and in religious life, this is *the* lesson God would impress upon us in his Word and works.

The caloric engine has grown more and more useful in the hands of the inventor. Over two hundred of the engines are now at work sawing, turning machinery, operating telegraphic machines, and propelling boats.

Who can tell us what the caloric engine may be and do half a century hence, or even before the year 1875?

Some of you may live to see the name of Ericsson outshine that of Fulton; because the steam engine is then among the relics of the past, and the safer, more economical rival, has the empire of the waters under his sceptre of *locomotion*. We are living fast, and rapidly God is educating the world.

CHAPTER XIII.

The Rebellion—Revolutions in Sweden—Outbreaks in the United States—Our Army and Navy—Captain Ericsson when the Civil War opened.

WE come to the great rebellion in the American Republic, and the connection of our inventor with it. His own native Sweden had been no stranger to revolutions. For ten centuries, the period of which there is an outline history, there was a succession of popular movements often culminating in scenes of bloodshed.

The last before he left the shores of Sweden was when Russia gave to that Government Norway, because she joined the great powers leagued together to crush Napoleon. This has been already noticed. It may be both interesting and instructive to pause here a moment, and glance over the annals of rebellion in this republic.

The first movement which could properly bear that name, was a proposition made by officers of the Federal

army in 1782, to consolidate into one government the thirteen colonies or States, and enthrone George Washington, virtually, if not formally, making him king. The treason of course failed; for it was an attempt to betray liberty itself, after a fearful sacrifice to maintain it.

The next outbreak of a popular character, was the Shays' Rebellion in Massachusetts in 1786–'87. Complaints had arisen against the taxation, the aristocracy of the Senate, the governor's salary, and other public acts and statutes. The revolt was fairly organized when Captain Daniel Shays, December, 1786, took command of the armed forces, numbering two thousand men. They broke up the courts at Worcester and Springfield, and marched on the arsenal at the latter place to take it. The militia under General Shepherd met the rebels, fired into their ranks, and soon dispersed them. Fourteen were tried and condemned to death, but afterward, with the captain, were pardoned.

Eight years later the Whiskey Insurrection raged awhile in Pennsylvania, because of the tax imposed on the stimulant.

Twenty years more passed, when, in 1814, the opposition to the war with England took a threatening shape in the "Hartford Convention." This assembly held its sessions with closed doors for twenty days. The delegates, who were from the New England States, com-

plained of violations of the Constitution in the proclamation and prosecution of war. But *paper* battles only resulted from the exciting demonstration.

When the question of admitting Missouri into the Union in 1820 was agitated, a deep and alarming opposition to the widening area of slavery was apparent. The excitement was allayed by the "Compromise," which excluded slavery from all territories north of latitude 36° 30′. Its repeal was the far-off tocsin of martial conflict, and the death-knell of slavery, though intended to suppress discussion of it, and to extend its dark dominion. It was treason to freedom, of which the civil conflict is the grand tragedy and settlement.

The negro race was not alone in oppression, nor as an occasion of testing the justice and strength of the Republic. In 1828 and the two years following commenced the effort to remove the Indians from Georgia, and get their lands. The Supreme Court of the United States decided against the injustice of the State, but the verdict was set aside by Georgia, thus resisting the General Government. The robbery went on, and added to our account as a nation, with Him, of whose equity and power even Thomas Jefferson said, "I tremble for my country when I remember that God is just, and that his justice will not sleep forever!"

Right in the wake of this crime came the "South Carolina Nullification" in 1832. John C. Calhoun had

advocated the false doctrine of the independence of the States; that is, the right of each commonwealth to criticize the Government at Washington, and condemn and resist measures deemed to be an invasion of the sovereignty of a State.

When the tariff for collecting revenue did not agree with the views of South Carolina, there was rebellion. She determined to confront the National Administration. But General Jackson was not the man to trifle with treason, and soon pointed the cannon toward its headquarters, Charleston Harbor. Then followed a calm of nearly thirty years in the fiery "Palmetto State."

In 1842 the Dorr Rebellion broke out in Rhode Island. The ground of hostility to the authorities was the unequal representation of the people, the basis of it being the defective charter from Charles II. in 1663. Thomas Wilson Dorr was the leader of the revolt. Under him another State Constitution was adopted, and he was elected governor. Then followed the appeal to arms—a fight—and peace again. The evils complained of were subsequently removed.

The *Mormons* were the next rebels. They went to Utah in 1848, and the following year formed their own constitution, naming their territory *Deseret*. They sent their documents to Washington. The independent commonwealth was not allowed to have her own way. So she rebelled, and in 1856 a mob drove the U. S. Judge,

Drummond, from his bench, and tried to take the reins of authority.

How insignificant all these, nearly a dozen rebellious outbreaks, excepting the very significant and prophetic resistance to the Government of Georgia and South Carolina, foreshadowing the storm which has since shaken the pillars of the Republic, appear, compared to the civil war.

When it broke upon us, Captain Ericsson was not thought by any one, nor thought himself, to be destined to act a principal part in breasting the angry and terrible conflict of moral and political elements. His experience among the officials at Washington had decided him to make no more offers of his engineering services, whether in time of peace or war, to the Government. It may well kindle a blush of shame upon a patriot's cheek to know that trickery and bribery quite as often give success to those who live on the public treasury, as pure principles and transparent honesty. The days *have* seemed to be past, when Christian men can enter the arena of politics and win the popular suffrage, if *consistent* in their loyalty to God.

The upright Ericsson would have nothing to do with the arrogant and corrupt officials infesting the departments at the capital. He believed thoroughly, while advancing material interests, in the sentiment of Washington, that of private and national character, "religion and

morality are indispensable supports." And he was willing to employ his fine inventive intellect, apart from political chicanery and patronage.

The thunder of cannon against the walls of Sumter, the insane declaration of war upon the existence of the Republic, turned the attention of patriotic capitalists to our defences, especially to our navy. We had never been a mighty nation on the sea, because excepting the Revolution, and the war of 1812, we had used the sea almost entirely for our rapidly-extending commerce. Would you like to have a glimpse of our national "life on the ocean wave"?

On 1607, thirteen years before the May Flower rocked in Massachusetts Bay, Francis Newport landed on the coast of Virginia with colonists, whose object of adventure was wealth and luxury. Six years later, Captain Samuel Argal, under the pretext of a fishing expedition, left the shores of Virginia with eleven vessels for the coast of Nova Scotia. The French port of St. Sauveur was unarmed, and, attacked by Argal, fell with but little resistance into his hands. The fleet carried fourteen guns. This was the first colonial conflict with rival settlers, and in a time of perfect peace; the earliest aggression of the South upon the North, for self-aggrandizement at the expense of justice and humanity. This was followed by a similar outrage upon the Dutch settlement of New York. Soon after the fleet was scattered and one of the vessels

lost. The prisoners taken from the shipwrecked crew just escaped execution as pirates.

In 1814, on the banks of the Hudson, near New York, was built the first decked vessel, styled in the account given of it, a *yacht*. It sailed through Hell Gate into Long Island Sound, and away to Cape Cod, no trivial enterprise before the May Flower touched the sands of that nameless point, whose base was sixty miles back among the Indian wigwams of the unexplored wilderness. Meanwhile the Dutch had reared the walls of a fort at New Amsterdam; doubtless the pioneer fortification of civilization in the limits of the present United States. Here was a centre of trade in small craft with the natives along the bays and rivers of their territory. Thirteen years after the shallop struck "Forefathers' Rock," according to the best record we have of that period, the first ship was built at Boston. From the launching of this small vessel navigation in New England went forward with characteristic rapidity, especially the fisheries, which became the unappointed hardy nautical school of American seamen. Such was the dawn of existence to the American navy. It is not the place to give a sketch of the growth of this power. I will add a few striking facts.

The *Reprisal* was the first American man-of-war which appeared in foreign waters, reaching France in 1776, with Franklin on board, and having several prizes in company with her. Then followed the heroic deeds of our com-

modores, Rodgers, of the *Guerriere*, Bainbridge, of the *Independence*, and Perry, of the *Java*, with other gallant commanders, until even boasting Britain feared our prowess on the high seas. The last war with England displayed still greater valor and victories, if possible. The names of Perry, Macdonough, Porter, and other naval warriors, shine in the world's history.

You will be willing to turn aside awhile from the narrative of the hero of peaceful revolutions and successful warfare in our navy, to read the story of a fearless and patriotic youth, who, when dying, left an imperishable watchword behind for all ages. He lived in the days of wooden war-ships, and was among the pioneer sailors on gunboats, such as the country then afforded. Says an American writer:

"Death, which so often removes from the scenes of their glory the young and heroic, has never triumphed over a victim more beloved and lamented by the nation he served than James Lawrence. His career was marked by a series of brilliant actions which had attracted the highest confidence and hope in his compatriots, and his untimely loss was mourned as a national calamity.

"Captain James Lawrence was born on the 1st of October, 1781, at Burlington, in New Jersey, and was the youngest son of John Lawrence, Esq., counsellor-at-law of that place. Soon after his birth he had the misfortune to lose his mother, and the care of his early years

devolved on his two sisters, who seem to have cultivated the moral qualities of his heart with singular success.

"At the age of twelve he evinced a strong partiality for the sea; but his father disapproving of that plan of life, and wishing him to pursue the profession of law, young Lawrence acquiesced, and passed with reputation through the grammar school at Burlington, when, finding that the pecuniary situation of his father would not furnish him with the means of completing his education at any college or university, he commenced the study of law with his brother, the late John Lawrence, Esq., at Woodbury. He was now only thirteen years of age, a period of life when the grave pursuits of jurisprudence can scarcely be presumed to have many attractions for a young and ardent fancy, already inflamed with the love of wandering. He continued, however, a reluctant student for about two years, when the death of his father leaving him more at liberty to pursue his favorite inclination, he prevailed on his brother to place him under the care of Mr. Griscomb, at Burlington, for the purpose of studying navigation. He here remained for three months, at the expiration of which time, on application to the Navy Department, he received a warrant as midshipman, on the 4th of September, 1798.

"His first voyage was in the ship Ganges, Captain Tingey, on a cruise to the West Indies. He afterwards sailed in different vessels for upwards of two years, and

was then made an acting lieutenant on board the frigate *Adams*, Captain Robinson, where he continued till the reduction of the navy; in consequence of which his appointment was not confirmed, and he remained in the rank of midshipmen.

"On the commencement of the war with Tripoli, in 1801, he was promoted to a lieutenancy, and sailed to the Mediterranean as first lieutenant of the schooner *Enterprise* in 1803. From this vessel he was transferred to the frigate *John Adams*, as first lieutenant; and, after remaining in the Mediterranean about three years, he returned with Commodore Preble to the United States.

"Soon after, he was again sent to the Mediterranean as commander of gunboat No. 6. These vessels were originally destined to serve merely along the American coast, and, however qualified for harbor or river defence, were deemed exceedingly insecure in crossing the Atlantic. Being very small, with a disproportionably large gun, and necessarily laden very deeply, they labored under every disadvantage in encountering heavy gales. So decided were the opinions of the naval officers against them, that no one would, perhaps, have been willing to risk his life in them on such a voyage, for any motive of private advantage, or from any consideration, except the performance of his duty. 'Lawrence has told me,' writes one of his brother officers, 'that when he went on board the gunboat, he had not the faintest idea that he would ever

arrive out to the Mediterranean in her, or, indeed, arrive anywhere else. He has also told me, that on the coast of Europe he met an English frigate, the captain of which would not at first believe that he had crossed the Atlantic in such a vessel.' He did not, however, go with less alacrity, and he unexpectedly arrived safely in the Mediterranean, where he remained for about sixteen months.

"On the 10th of February, 1813, he captured the English brig *Resolution*, of ten guns, laden with provisions and about twenty-five thousand dollars in specie, but as she was a dull sailer, and he could not spare hands to man her, he took out the money and the crew, and burnt her. He then ran down the coast for Maranham, and, after cruising near that place and Surinam, till the 23d of February, he stood for Demarara. On the next morning he discovered a brig to leeward, and chased her so near the shore that he was obliged to haul off for want of a pilot. During the chase, however, he had discovered a vessel at anchor outside of the bar of Demarara River, with English colors flying, and now began beating round the Corobano bank to get at her; when, between three and four o'clock in the afternoon, another sail was seen on his weather quarter, edging down for him. As she approached, she hoisted English colors, and proved to be the British brig *Peacock*, Captain Peake. The *Hornet* was immediately cleared for action, and kept close to the

wind, in order to get the weather gauge of the approaching vessel. At ten minutes past five, finding that he could weather the enemy, Captain Lawrence hoisted American colors, tacked, and in about a quarter of an hour, passed the British ship within half pistol-shot, and exchanged broadsides. The enemy was now in the act of wearing, when Captain Lawrence bore up, received his starboard broadside, and ran him close on board on the starboard quarter; from which position he kept up so close and bloody a fire, that in less than fifteen minutes from the commencement of the action, the British struck their colors, and hoisted a signal of distress. Lieutenant Shubrick instantly went on board, and found that she was cut to pieces, her captain killed, many of the crew killed and wounded, her mainmast gone by the board, six feet water in the hold, and sinking very fast. The two ships were immediately brought to anchor, and the *Hornet's* boats despatched to bring off the wounded; but, although her guns were thrown overboard, the shot holes which could be got at plugged, and every exertion made by pumping and bailing to keep her afloat, so completely had she been shattered that she sunk before the prisoners could be removed, carrying down thirteen of her crew, as well as three men belonging to the *Hornet*. Lieutenant Connor and the other officers and men employed in removing the prisoners, narrowly escaped by jumping into a boat, as the *Peacock* went down; and four seamen of

the *Hornet* ran up into the foretop at the same time, and were taken off by the boats.

"The *Peacock* was deemed one of the finest ships of her class in the British navy. In size she was about equal to the *Hornet*; but, in guns and men, the *Hornet* was somewhat, though very little, her superior; and by no means so much so as to give her any decided advantage. The loss on board the *Peacock* could not be precisely ascertained. Captain Peake was twice wounded, the second time mortally. Four men were found dead on board. The master and thirty-two others were wounded, three of whom afterward died. The *Hornet* had only one man killed, and two slightly wounded. Her rigging and sails were much cut, but her hull received very little injury. During the engagement, the vessel which the *Hornet* had been endeavoring to reach before the *Peacock* bore down, lay at anchor within six miles, and as she was a brig—the *Espiegle*—carrying fifteen thirty-two pound carronades and two long nines, it was supposed that she would attack the *Hornet*, after the latter had been disabled by the combat. The *Hornet* was immediately prepared to receive her, and, by nine o'clock at night, her boats were stowed, a new set of sails bent, and every thing ready for action. She, however, declined coming out. The next morning Captain Lawrence found that he had two hundred and seventy souls on board the *Hornet*, and, as his crew had been for some time on short allow-

ance, resolved to steer for the United States. The officers of the *Peacock* received from those of the *Hornet* the most humane and honorable treatment; so penetrated with gratitude were they for the kindness which they had experienced, that they could not restrain the expression of their feelings till they reached England, but, on their arrival in the United States, published a letter of thanks to Captain Lawrence and his officers, in which they declared that such was the liberality displayed to them, that 'they ceased to consider themselves prisoners.' Nor was the rough generosity of the *Hornet's* crew less honorable. As the sailors of the *Peacock* had lost every thing except what they had on their backs, when she went down, the crew of the *Hornet* united to relieve them; and made every English sailor a present of two shirts and a blue jacket and pair of trowsers; a true-hearted liberality, which raises them in our estimation higher than even their victory.

"Captain Lawrence returned to New York in safety, and, besides the applause which his country lavished upon him for his good conduct, had the satisfaction of learning, as we have already observed, that he had been promoted during his absence, and his rank settled to his perfect satisfaction. Soon after his return he was ordered to the command of the frigate *Constitution*, with the temporary superintendence of the navy yard at New York. But the next day, to his great regret, he received instructions to

repair to Boston, and take command of the *Chesapeake* frigate, then nearly ready for sea. This appointment was peculiarly unpleasant, because the *Chesapeake* was not only considered as one of the very worst ships in the navy, but, in consequence of her disgrace in the rencontre with the *Leopard*, labored under that dispiriting stigma among sailors, of being an 'unlucky ship.' These circumstances, combined with the state of his family, made Captain Lawrence unwilling to go to sea immediately, and he, therefore, requested to retain his situation in the *Hornet*. Disappointed in this wish, he then took command of the *Chesapeake* at Boston, where he had been but a short time, when the British frigate *Shannon*, Captain Broke, appeared before the harbor, for the avowed purpose of seeking a combat with the *Chesapeake*. Stung with the repeated disasters of the British frigates, this officer resolved to make an effort to retrieve them; and, when he deemed his ship perfectly prepared for that purpose, sent a formal challenge to Captain Lawrence.

"'As the *Chesapeake*'—his letter began—'appears now ready for sea, I request you will do me the favor to meet the *Shannon* with her, ship to ship, to try the fortune of our respective flags. To an officer of your character, it requires some apology for proceeding to further particulars. Be assured, sir, that it is not from any doubt I entertain of your wishing to close with my proposal, but merely to provide an answer to any objection that might

be made—and very reasonably—upon the chance of our receiving unfair support.' After observing that Commodore Rodgers had not accepted several verbal challenges which he had given, Captain Broke then proceeds to state very minutely the force of the *Shannon*, and offers to send all British ships out of reach, so that they might have a fair combat, at any place within a certain range along the coast of New England, which he specified; if more agreeable, he offers to sail together, and to warn the *Chesapeake*, by means of private signals of the approach of British ships-of-war, till they reach some solitary spot—or to sail with a flag of truce to any place out of the reach of British aid, so that the flag should be hauled down when it was deemed fair to begin hostilities. 'I entreat you, sir,' he concludes, 'not to imagine that I am urged by mere personal vanity to the wish of meeting the *Chesapeake*, or that I depend only upon your personal ambition for your acceding to this invitation. We have both nobler motives. You will feel it as a compliment, if I say that the result of our meeting may be the most grateful service I can render to my country; and I doubt not that you, equally confident of success, will feel convinced that it is only by repeated triumphs in even combats, that your little navy can now hope to console your country for the loss of that trade it can no longer protect.'

"The style of this letter, with the exception of the puerile bravado about Commodore Rodgers, is frank and

manly; and, if the force of the *Shannon* were correctly stated, would be such a challenge as might well be sent from a brave seaman to a gallant adversary. We, however, are but two well satisfied, that Captain Broke studiously underrated the number of his guns and crew; or that, after his challenge, he must have received additions to both. That the *Shannon* had more guns than the number stated by her commander, we learn from the testimony of the surviving officers of the *Chesapeake*; who also assert, that she had three hundred and seventy-six men; that she had an officer and sixteen men from the *Belle Poule;* and that the hats of some of her seamen were marked *Tenedos*. Such as it was, however, this letter, most unfortunately, never reached Captain Lawrence. If he had received it—if he had been thus warned to prepare his ship—if he had had an opportunity of selecting his officers, and disciplining his crew—if, in short, he had been able to place the *Chesapeake* on any thing like equal terms with the *Shannon*, the combat might have been more bloody—there might have been such an engagement as has not yet been seen between single ships on the ocean! though we cannot suffer ourselves to doubt the result of it. But he knew nothing of this challenge—he saw only the *Shannon* riding before him in defiance; he remembered the spirit with which he himself had overawed a superior, and he could not brook for a moment, that an enemy, which seemed to be his equal, should in-

sult his flag. Although, therefore, the *Chesapeake* was comparatively an inferior ship—although his first lieutenant was sick on shore—although three of his lieutenants had recently left her; and, of the four who remained, two were only midshipmen, acting as lieutenants—although part of his crew were new hands, and all of them had lost some of their discipline by staying in port—yet, as he would have gone to sea in that situation had no enemy appeared, he felt himself bound not to delay sailing on that account, and throwing himself, therefore, on his courage and his fortune, he determined at once to attack the enemy. It was on the morning of the 1st of June, 1813, that the *Chesapeake* sailed out of the harbor of Boston, to meet the *Shannon*. As soon as she got under weigh, Captain Lawrence called the crew together, and, having hoisted the white flag, with the motto of 'free trade and sailors' rights,' made a short address. His speech, however, was received with no enthusiasm—on the contrary, signs of dissatisfaction were evident; particularly from a boatswain's mate, a Portuguese, who seemed to be at the head of the malcontents; and complaints were muttered, that they had not yet received their prize-money. Such expressions, at the eve of an action, were but ill bodings of the result of it; but Captain Lawrence, ignorant as he was of the character of his sailors, and unwilling at such a moment to damp their spirits by harshness, preserved his accustomed calmness, and had

prize-checks, at once, given by the purser to those who had not received them. While this scene was passing, the *Shannon* observing the *Chesapeake* coming out, bore away. The *Chesapeake* followed her till four o'clock in the afternoon, when she hauled up and fired a gun, on which the *Shannon* hove to. They manœuvred for some time, till at about a quarter before six they approached within pistol-shot, and exchanged broadsides.

"These broadsides were both bloody; but the fire of the *Shannon* was most fortunate in the destruction of officers. The fourth lieutenant, Mr. Ballard, was mortally wounded—the sailing master was killed, and Captain Lawrence received a musket ball in his leg, which caused great pain, and profuse bleeding, but he leaned on the companion-way, and continued to order and to animate his crew. A second and a third broadside was exchanged, with evident advantage on the part of the *Chesapeake;* but, unfortunately, among those now wounded on board of her, was the first lieutenant, Mr. Ludlow, who was carried below—three men were successively shot from the helm in about twelve minutes from the commencement of the action; and, as the hands were shifting, a shot disabled her foresail, so that she would no longer answer her helm, and her anchor caught in one of the afterports of the *Shannon*, which enabled the latter to rake her upperdeck. As soon as Lawrence perceived that she was falling to leeward, and that by the *Shannon's* filling she would fall on

board, he called his boarders, and was giving orders about the foresail, when he received a musket ball in his body. The bugleman, who should have called the boarders, did not do his duty; and, at this moment, Commodore Broke, whose ship had suffered so much that he was preparing to repel boarding, perceiving, from this accident, how the deck of the *Chesapeake* was swept, jumped on board with about twenty men. They would have been instantly repelled; but the captain, the first lieutenant, the sailing master, the boatswain, lieutenant of marines, the only acting lieutenant on the spardeck, were all killed or disabled. At the call of the boarders, Lieutenant Cox ran on deck, but just in time to receive his falling commander, and bear him below. Lieutenant Budd—the second lieutenant—led up the boarders, but only fifteen or twenty would follow him, and with these he defended the ship till he was wounded and disabled. Lieutenant Ludlow, wounded as he was, hurried upon deck, where he soon received a mortal cut from a sabre. The marines who were engaged fought with desperate courage; but they were few in numbers; too many of them having followed the Portuguese boatswain's mate, who exclaimed, it is said, as he skulked below, 'so much for not paying men their prize-money.' Meanwhile the *Shannon* threw on board sixty additional men, who soon succeeded in overpowering the seamen of the *Chesapeake*, who had now no officers to lead or rally them, and took possession of the

ship; which was not, however, surrendered by any signal of submission; but became the enemy's, only because they were able to overwhelm all who were in a condition to resist.

"As Captain Lawrence was carried below, he perceived the melancholy condition of the *Chesapeake*, but cried out, 'Don't surrender the ship.' He was taken down in the wardroom, and as he lay in excruciating pain, perceiving that the noise above had ceased, he ordered the surgeon to go on deck, and tell the officers to fight on to the last, and never strike the colors. 'They shall wave,' said he, 'while I live.' But it was too late to resist or to struggle longer; the enemy had already possession of the ship. As Captain Lawrence's wounds would not allow of his removal, he continued in the wardroom, surrounded by his wounded officers, and, after lingering in great pain for four days, during which his sufferings were too acute to permit him to speak, or, perhaps, to think of the sad events he had just witnessed, or do more than ask for what his situation required, he died on the 5th of June. His body was wrapped in the colors of the *Chesapeake*, and laid on the quarterdeck, until they arrived at Halifax, where he was buried with the highest military and naval honors; the British officers forgetting for a moment, in their admiration of his character, that he had been but lately their enemy. His pall was supported by the oldest captains in the navy then at Halifax,

and no demonstration of respectful attention was omitted to honor the remains of a brave, but unfortunate stranger. Thus prematurely perished, at the age of thirty-two, this gallant and generous seaman."

All the vessels up to this period were propelled by *canvas*. For almost half a century our navy had little to do on the watery plain of national warfare. The South, anticipating a struggle for supremacy, had for the last few years preceding the civil conflict, artfully managed, through her control of the Government, to scatter the vessels of our navy, which at best was poorly prepared for war, to different parts of the world.

After the political storm which has burst upon us began to lower upon the Southern sky during the winter of 1860–'61, Congress appointed a Committee to inquire into the condition of our naval force.

And do you know the result? if not, can you guess?

Of the ninety vessels, the steamer *Brooklyn*, carrying twenty-five guns, and the *Relief* with two guns, a store-ship, *only were left to defend the entire Atlantic coast* of many thousands of miles!

"Where were all the rest?" you ask.

Twenty-eight were lying in port dismantled and unfit for service. The other fifty were in the East Indies, in the Pacific Ocean, and in various harbors at home and abroad, but unavailable for armed protection of the Republic, in danger from her own *petted* children.

During that same winter *fifty-six officers* of the navy resigned because they were tired of the old flag; eleven of these were educated in the United States Naval Academy. Grateful men! you exclaim. There is no gratitude in *treason*. This demon expels the nobler sentiments of the soul.

The nation waked up from a pleasant dream to the music of cannon; and lo! with no army, but few arms, and a navy reduced to this well-nigh worthless weakness by treachery, we were in the midst of hostile "brethren" who were prepared to enter the field with at least forty thousand men armed for battle, and their hands firmly grasping all the sources of our strength. And yet Congress adjourned without making a new law for the work of preparation to meet our enemies; not a ship was recalled from the distant stations, where their presence was comparatively unnecessary, but rather a *show* of naval strength.

About three weeks after the new President was inaugurated, for the first time, with soldiers and cannon to guard him and "keep the peace," the sloop-of-war *Cumberland*, flag-ship of Commodore Pendergrast, sailed into Chesapeake Bay. The now loyal Secretary of the Navy laid his official hand on this good ship, and kept her at Norfolk for the hour of peril which seemed to be near. There we had a noble navy yard filled with arms and ammunition.

The vessels were not in condition to be taken away into service; but worse than this, no effort was made, because it was feared the traitors might *be offended;* in other words, it was the well-intended policy to conciliate and not irritate, the determined foes of the Republic. The *Merrimac* was ordered to be put in order for sea and tow out other ships, and then proceed to Philadelphia.

Commodore McAuley, a cunning traitor, was the commandant of the yard, and watching every movement there. April 17th, 1861, the *Merrimac* was ready to start, but the commodore refused to have the fires kindled. The next morning, however, the smoke rose from the dark pipes, and the steam began to hiss. Still she did not move, and before night the furnaces were out. This startled the Government, and Commodore Paulding was sent with a small force to look after the navy yard and its officers. The troops were mainly Massachusetts "boys" who had arrived just before at Fortress Monroe. What a sad expedition! The commandant was working hard for treason. The channel had been filled with obstructions to keep the vessels at Norfolk, and many of them were scuttled; that is, opened at the bottom to let in the water. So Commodore Paulding, finding that the powder magazine was seized and resistance was hazardous, made a finish of the destruction, as far as possible, to weaken the rebels, and towing the *Cumberland* away through the very flames of burning masts and ships, left the ruins to

the enemy. We lost then and there, two thousand cannon, and a great quantity of powder, to be used against us.

You will learn hereafter what that memorable scene, with its *Cumberland* and *Merrimac*, had to do with Ericsson and his marvellous inventions. While the property of the United States was on fire at Norfolk, the Swede was quietly bending over his diagrams and models in his pleasant residence fronting St. John's Park, New York.

CHAPTER XIV.

The "Merchant Prince"—His Interview with Captain Ericsson—The Inventor and the Naval Department—The Mysterious Box—On the way to Washington—Its fortunes there.

IT is not strange that patriotic men of wealth began to think and act in earnest in behalf of our navy. Private citizens poured out their money like water, for the nation's deliverance from the dark plot against its life.

Donald McKay, the American ship-builder, who was in London during the memorable winter referred to already, wrote home, urging the country to strengthen the navy by building new vessels, and plating with iron the old wooden ones.

As spring time approached another warning voice was lifted in the nation's ear. Civil engineer, Mr. Charles Ellet, called the attention of the Government to our "Military Incapacity." Had you been in the Capitol, which has recently with lavish expense been put in ele-

gant order, in February, you would have seen in each Congressman's hand a pamphlet bearing the title given above. He seems to have had a prophet's foresight, as extracts from his earnest appeal will show. He said: "It is not generally known that the rebels have now *five steam rams* nearly ready for use. Of these, the one at Norfolk is doubtless the most formidable, being the United States steam frigate *Merrimac*, which has been so strengthened, that in the opinion of the rebels it may be used as a *ram*. But we have not a single vessel at sea, nor, as far as I know, in course of construction, able to cope at all with a well-built ram. If the *Merrimac* is permitted to escape from Elizabeth River, she will be almost certain to commit depredations on our armed and unarmed vessels in Hampton Roads, and may even be expected to pass out under the guns of Fortress Monroe, and prey upon our commerce in Chesapeake Bay. Indeed, if the alterations have been skilfully made, and she succeeds in getting to sea, she will not only be a terrible scourge to our commerce, but may also prove to be a most dangerous visitor to our blockading squadrons off the harbors of the Southern coasts. I think the danger from these tremendous engines *is very imminent but not at all appreciated*. Experience derived from accidental collisions, shows that a vessel struck in the waist by a steam ram, at sea, will go down almost instantaneously, and involve, as it often has happened, all on board." The ram,

you know, is an iron front or prow made on purpose to strike an enemy's ships.

First in the field of activity here was C. S. Bushnell, Esq., of New Haven, Connecticut. He had been something of "a salt;" in other words, had in his youth been a sailor. He had considerable knowledge of ships, and his quick intellect saw that the Republic must add to her scientific achievements greater progress in naval warfare. God's providence here is seen most clearly. He had given wealth to the lover of ocean-leviathans for man's use, and now sent an awakening inspiration to make that experience, passion for nautical enterprise, and money, available in the coming crisis of the nation's existence. Mr. Bushnell thought and dreamed over ships, like ancient chieftains in a coat of mail—noble vessels clad in iron—sea kings walking the waters in metallic, impenetrable robes.

He talked with men of science, and studied plans which they proposed, for such unknown yet possible warriors. The result of the consultations, suggestions, and diagrams, was a projected gunboat, to be called the "Galena." It is decided to build the "craft." The ablest naval architects scan doubtfully the pictured iron-Neptune.

"The weight of iron will sink her," declares one.

"She may float, but can make no headway in a heavy sea," thinks another.

Away to New York goes the perplexed but not dis-

couraged merchant. The fame of Captain Ericsson was familiar to him. As a final resort, a decisive counsellor, he seeks his plain, substantial, pleasant residence in Beach street. The enthusiastic, yet dignified Swede, runs his finger over the diagrams, and listens to the equally enthusiastic merchant. "Your calculations are correct," he remarks, "but the vessel will not be invulnerable. Her sides will not be shot-proof." Captain Ericsson then inquires if Mr. Bushnell desired to undertake the construction of a floating battery impenetrable by the heaviest ball, able to resist any attack by land fortress, or on the sea. This was precisely what the "wide-awake Yankee" wanted; and it was the darling cherished ideal of the noble Swede. He rises, takes from a shelf a plain casket, not of jewels or gold, but of miniature machinery. No diamond-digger, pearl-diver, or gold-hunter, had ever toiled so hard for his treasure, as had that strong man for the contents of that oblong box, a foot and a half by fourteen inches. He lifts the machine from its cage, saying: "This is the result of the labors of twenty years of my life."

The inventor explains to his intensely interested listener the marvel of his busy brain. When this creation of a splendid mind lay like a perfect chronometer before his eye, and was already proudly, in his vision, riding the waves, he was fired with the greatness of the revolution on that field of conflict, but partially discerned, reposing

like an infant giant in the cradle, within the wooden casket. Undeveloped power was clearly *there*.

"Go with me to Washington and help me to get this invention before the Government," earnestly urges the capitalist.

"Pardon me, that I cannot do. I must decline any farther negotiations there," replies Captain Ericsson.

He further told Mr. Bushnell, that a few years before he sent a duplicate of the model to Louis Napoleon, but nothing had been attempted. So near did we come by our stupidity losing for ourselves, and giving to the most ambitious monarch of Europe, the grandest offspring of modern genius. But again a kind Providence watched over a Republic, and a home for the Ericssons of the old world. The inventor offered to commit to Mr. Bushnell's disposal the plans and model. In a few hours he bade the captain adieu, and with the box started for the depot of the railway leading to Washington. The man of wealth was never happier counting his possessions, than now, with the casket whose contents had been worthless to kings. Nobody in the cars cares, further than a passing curiosity, perhaps, as the glance rests on the singular piece of baggage by the traveller's side. It is altogether probable some supposed it a wandering jeweller's stock in trade, little dreaming that our nation's honor was carried in the unpretending box.

"Washington!" called out the conductor. Mr. Bush-

nell, box in hand, stepped into Pennsylvania Avenue and sought quarters at a hotel. Fortunately for him he met soon after two men of wealth and noble enterprise from Troy, New York. To these gentlemen, Messrs. J. A. Griswold and J. F. Winslow, he showed his treasure and told his plans. They decided to embark with him in the design of testing the value of the contents of the inventor's casket.

We will glance at Congress again. August 3d, 1861, it had directed the Secretary of the Navy to appoint "a Board of three skilful naval officers" to investigate the plans for iron clad ships, batteries, &c., and if they reported favorably, the Secretary might expend $1,500,000 in building some of these metallic sea warriors. Commodores J. Smith and H. Paulding, and Captain C. H. Davis, were selected for that Board. This was the condition of naval affairs when Captain Ericsson's friends were in Washington.

The first thing was to call on President Lincoln. The mysterious box was opened, the models taken out, the diagrams displayed. Our practical, sensible President, looked over the miniature monitors carefully, and said: "Gentlemen, the invention strikes me very favorably, but I do not pretend to have much knowledge of such matters. I will, however, accompany you to the Naval Board, and lay the matter before it." Mr. Lincoln led his visitors to the marble pile in which the Board held its consultations.

The exhibition of mechanism and figures was again made, but, like the British Admiralty, the members were incredulous. It was a new thing for the waters, indeed, and without any likeness to the floating creations of human skill, since time began.

A prominant naval officer said: "It resembles nothing in the heavens above, or the earth beneath, or the waters under the earth. You can take it home and *worship it without violating any commandment.*"

What shall be done now? The money-kings hold a council, and conclude, if possible, to bring Captain Ericsson before the arbiters of the monitor's fate. With his clear explanations and glowing enthusiasm, they were sure of producing conviction on the minds of the Board. The night train of cars bore Mr. Bushnell to New York. It was no small endeavor demanded to persuade the inventor, disgusted with the Capital, to go there again; but the evening came, and in the gaslight of the great city the two *noblemen* moved toward the depot for Washington. The arrival there was followed by another interview with the Naval Board, and what the wise officials did we shall see.

CHAPTER XV.

The Great Decision—Ratified by Congress—The Contract—Its strictness alarms the Money Kings—The Monitor is begun—The Builders and its Building—The Iron-works—The Strange Craft completed.

IN a few days the Committee reported to the Secretary of the Navy their decision, which was approved by Congress.

I hear a voice exclaim: "I know what it was; to let Captain Ericsson build his *Monitor*."

Yes, but do you know how near he came losing the "*job*"?

The recommendation was to build three iron-clads, the *Galena*, the *Ironsides*, and the *Monitor*. But see how very cautiously and curiously the permission given to the Swede to build, was expressed:

"J. Ericsson, New York. This plan of a floating battery is novel, but seems to be based upon a principle which will render the battery shot and shell-proof. It is to be apprehended that her properties for sea are not such as a sea-going vessel should possess. But she may be

moved from one place to another on the coast in smooth water. We recommend that an *experiment* be made with one battery of this description on the terms proposed, with a guarantee and forfeiture in case of failure in any of the properties and points of the vessel as proposed. Price $175,000." The contract required that the battery be finished within a hundred days from the date of signing it.

We never knew the importance which God in his providence attaches to any act, however trivial it may seem to us. In this view there are *no trifles* in human life. The Congressional Committee and Congress itself had no idea at all of the vast, the momentous result of that *cautious* conclusion. It is felt around the globe. At the time there was a new danger of failure; the strictness of the contract frightened the captain's friends, who held the purse.

They consulted together. "What if the fears of the committee prove well founded? What will become of the fortune invested?" was the anxious inquiry.

But patriotism prevailed, and the confidence of the wealthy friends of the inventor in his clear head which had *thought out* the monitor, was unshaken. The contract to build the vessel was given to Mr. J. F. Rowland, of the Continental Works, New York, and the work at once commenced. Step into the grand manufactory of these iron corsairs of the sea.

"What are those heaps back of the forges?" One who was there will answer:

"They are 'scrap iron'—iron of every form and use, which, having performed its functions in one shape, has been brought here from a thousand quarters to undergo a new transmutation. In the economy of manufactures, as in that of nature, nothing is absolutely lost. In one heap we see piled up fragments of steam engines, reaping machines, and the like; close by is a pile of the worn-out fragments of smaller wares. We took the trouble to note some of the articles in this pile of old iron. There were locks and padlocks, rusty keys, kitchen pokers, knife-blades, screws, steelyard beams, skate irons, curling-tongs, halves of shears, sofa springs, cork-screws, shovel-blades, tong-handles, pot-hooks, spoons, ladles, bridle-bits, and above all horse-shoes. Not a bit or fragment of iron is lost. Every ounce has its value, transmutable, if not into gold, into copper and silver when brought to any foundry. The larger pieces have to be cut up to get them into manageable size."

"And how can such solid iron be *cut?*"

"This is done by the 'Cutting Machine'—an instrument not unlike, in general appearance, the 'straw-cutters' used by farmers, in which the knife descends perpendicularly. The thickest boiler-plates are shred by it as easily as a child cuts a sheet of paper with her scissors; bars as

large as a man's ancle are cut apart with no more apparent effort than is required to slice a radish."

"I would like to know what is done with the *metallic kindling wood*, after the scissors have made it fine," a reader adds.

"These scraps are piled up into 'fagots' about two feet square, and thrust into the furnaces of which we see a row, looking not unlike bakers' ovens, and in fact scarcely larger. The draft of these is supplied by a fan, which revolves eighteen hundred times in a minute, creating the most intense heat; tongues of white flame shoot out from every crack and crevice. In about an hour the loose fagot is brought to a welding heat. One workman raises the furnace-door, while another grasps the ductile fagot with a long pair of tongs, and by means of a chain suspended from a movable pulley, wheels it around and places it on the anvil of the forge. It is of an intense cherry-red, so bright that the eye can hardly look upon it, and apparently as ductile as wax. The end of a long iron rod, with a crank-like bend in the handle, is laid on the fagot. Down comes the ponderous hammer; the first blow shrinks the glowing mass to half its former dimensions, and welds it firmly to the handle, by which the stalwart workman turns it over and over. The blows fall thick and fast, and in two minutes the fagot is reduced to a solid mass, looking like a rough fragment of joist, some four feet long and six inches square. This is called

a 'bloom,' and is a homogeneous mass of iron; the locks, bolts, boiler-plates, pokers, screws, and horse-shoes of which it was composed having lost their personal identity. A long-handled knife is then applied; one blow of the hammer upon this severs the rod from the bloom. This is grasped, still red-hot, by another workman with a pair of tongs, placed upon a truck, and wheeled away to cool.

"These blooms are to be welded and hammered into plates."

"And what is the next process in plate-making?"

"First, the blooms are put into a furnace till made soft by the intense heat. Then the crane swings round; the bar is withdrawn from the furnace and wheeled under the hammer. This comes down with a heavy thud from its full height, with its fifteen thousand and more pounds' weight. These blows are too much for even the stub-born blooms; they seem to glow with impotent rage, and send out fiery sparks as the huge weight falls upon them and subdues them to its will. It is surprising to see the facility with which the dozen stout, swarthy Titans manage the huge bar of iron, which is delicately balanced upon its suspending chain. They tug at the handles until every muscle of their arms and chests stand out like whip-cords; they turn it over and over, presenting now this side, now that; now one edge, and then the other to the blows of the hammer. In a few moments the piled-up

blooms are blooms no more, and have been converted into a portion of a plate. This process is repeated, fresh piles of blooms being heaped up upon the end of the plate, heated and hammered out, until the required length has been attained.

"There is no limit to the size of the plates which may be made by the processes which we have described, except that imposed by the facility of handling. As they leave the forge the usual size of our *Roanoke* plates is about three feet wide, twelve or fifteen long, and four and a half inches thick."

"Tell us more about the great hammers," a curious young reader says.

"The dexterity with which this heavy hammer is managed by the workman on his high platform is something wonderful. He can give at will a blow of the full force of the ten-feet fall of the seven-and-a-half-tons hammer, aided by the expansive force of the steam let in above the piston, or a stroke as light as the tap of a lady's fan. 'We can chip an egg by this hammer without crushing it,' said Mr. Tugnot to us. We did not see the experiment tried; but as we watched the blows, now heavy, now light, as the sides or edges of the plate were presented, we had no doubt that the statement was literally true. We may say, in passing, that a couple of years ago one of the proprietors of the 'Franklin Forge,' while in Great Britain, visited the leading mechanical estab-

lishments, and found nothing equal to his own. 'I would not give shop-room to their machines!' he said."

"But how are the massive iron slabs bent to fit the curves and angles of the ship's side?"

"Each is taken to a furnace nearly the form of the plate, with a movable cover, and laid in the fiery bed to soften them before bending—being much too solid for shaping it. The plate, which has been for two hours in the furnace, has become thoroughly heated to a cherry red, in which state it is apparently almost as ductile as lead, and is ready for bending. A sort of three-fingered iron hand has been resting under it. A crane mounted on a truck moving upon rails is wheeled up, the chain attached to the hand, the plate withdrawn from the furnace, wheeled to the press, and swung between the dies. The upper one, which has been raised a yard or so, is let go, and comes down with a rush, and the softened plate is bent nearly to the form of the dies at once. There are also a set of screws along the sides for tightening the dies where necessary. The foreman glances along the plate, and if any part has not come down the screws at the place are tightened by means of a wrench turned by two stalwart men; the perspiration, forced out by the heat from the glowing plate and their own exertions, streams from every pore; but slowly and surely the screws are tightened, and the plate is brought exactly to the required sweep. The whole operation of bending, after the plate

has once been put in the press, hardly occupies five minutes. It is then swung out by the crane, and deposited upon a truck to be wheeled away and suffered to cool. Our plate is now finished, and will fit to its required place on the ship's side as closely as a coat made by the most accomplished master of the sartorial art."

"And how is the mailed leviathan built when the invulnerable *skin* is ready for it? which reminds one of Job's description of a living monster, from whose scales the spear harmlessly glanced, and whose defiant movements made 'the deep boil like a pot.'"

An observer and interesting writer, from whose sketches we have already quoted, will answer the question:

"All the preliminaries are the same for an iron vessel. The model, plans, and working drawings are made in precisely the same manner. But they are to be wrought out in iron instead of wood, which requires a great deviation in details. In place of large oaken 'knees' and 'futtocks,' we have slender-looking 'ribs' of iron; instead of thick planks for the 'skin,' we have iron plates of less than an inch in thickness. If we conceive an Indian canoe enlarged to the size of a man-of-war, we shall have an almost perfectly accurate idea of the hull of an iron vessel, as we see it in process of construction, bearing in mind only that the birch-bark sides and slender ashen supports are replaced by iron plates and ribs. These

plates and ribs are riveted together in the most elaborate manner, and this constitutes the chief apparent work of building an iron hull. Plates and ribs have been bent each to its exact shape, and the countless holes have been punched, every one being to a hair's-breadth in its appropriate place, before the pieces are brought to the stocks where they are to be built up. Upon each vessel are a hundred or two of workmen, seeming to cling like bees to its sides. Little portable furnaces at short intervals are heating the rivets, which boys are carrying around to the places where they are wanted. The riveter takes one of these, red-hot, and thrusts it through the hole; another workman, on the other side, holds a heavy iron bar against the end; the first workman, or, more likely, two of them —for the work must be done while the rivet is hot—hammers it home. A head is thus formed upon each side, and the rivet contracting in cooling binds the plates together, making a water-tight and air-tight joint. They have to work in almost every conceivable position; hammering upward, downward, and sideways. Sometimes we see them flat upon their backs, like miners in narrow seams of coal veins, striking upward. So plate by plate the hull is built up, from keel to deck. As we look upon her, the first impression is one of extreme fragility. If we cut an egg-shell lengthwise through the centre, one half of it would present an appearance not unlike, in shape and the comparative thickness of structure, our

iron hull, which is to float the defensive armor and aggressive turret of our new *Monitor*. In fact if it were to to be exposed to a cannon ball, it would be pierced as easily as an egg-shell would be by a pistol-bullet. But it is to be exposed to no such hazard. It is to be protected by a shield which, in a general way, we may consider impregnable."

We will see how this coat of mail is put on. "About five feet from the top of our hull an iron shelf, strongly braced, projects about four feet from the side. The width of this shelf is filled up first to the thickness of more than three feet with blocks of solid oak, all around the vessel. Outside of this solid mass of wood, braced with iron, are bolted the armor plates. It is yet a moot question whether a given thickness of iron possesses more resisting power if composed of one solid plate or of a series of thinner plates. The *Roanoke* armor is of solid plates; that of the new *Monitor* is of a series of five plates, one over another, each an inch thick, or five inches in all. This armor-shelf, as we have seen, projects about four feet over the sides of the thin hull, which we have described. It is some five feet high. This hull and all but two feet of the armor-shelf is below the water when the vessel is afloat; consequently, no shot fired from an opposing vessel or battery can possibly reach the lower hull without first having penetrated the iron-plated armor timbers. This 'platform'—for this is the most con-

venient term by which to designate it—projects at the sides, as we have seen, about four feet beyond the proper hull, but at the bow and stern much more, in order to afford a like protection to the rudder, propeller, anchor, and capstan. The projection at the stern is about ten feet, at the bow about sixteen."

And now let us look at the turret-building—the very part without which iron-clads, but not *monitors*, would darken the waters:

"The turret, or castle, is made of a series of plates of rolled iron, eleven in number, each an inch thick. As they come here from the mills where they are rolled they are simply iron boards, nine feet long, three wide, and an inch thick. Each of them is to be bent into the shape of the segment of a circle, twenty-three feet in diameter, which is to be the size of the turrets. For this purpose a massive press has been prepared. The bed, which is movable up and down, has its upper surface turned to the precise curve of the turret. This is raised by a hydraulic ram capable of giving a pressure of 1,400 tons against a stationary plate, whose lower surface has the same curve as the bed. The flat turret plate is slid into this press, the ram is worked, the bed rises, and the plate is bent to the curve of the mould. This is done without heating the plates, the enormous pressure being sufficient to give them the form required, without the necessity of rendering these inch plates ductile by heat. They are now taken to

an adjacent building and temporarily set up into a turret Here a circle of solid oak timber has been laid down as a foundation. Upon this a framework of boards has been built of the shape of the turret, to support the plates in the position which they are to assume. This looks much like the skeleton of a gigantic cistern; against this frame the plates of the first course are placed, the necessary holes for the bolts having been meanwhile punched in them. Then the second course is set up against this, the bolt holes of which must be made to correspond exactly with those of the first. This is done by a simple process. The end of a pine stick, of the size of the holes in the first plate, is covered with paint, thrust through the holes, leaving its mark on the plate of the second course. These white marks show exactly where the holes in the second course are to be made. This being done, the third course is set up in like manner; the places for the holes marked, the plates taken away and punched, brought back again, set up in place; and so on with the whole eleven courses of which the turret is composed. The holes in these plates are punched instead of being drilled, as we have seen done in the thick plates. This is performed by a powerful punching machine, which, at a single stroke, drives out a 'button,' making a clean hole of the size required as rapidly as the workmen can move the plates under the punch. We have seen twenty holes of this size punched in a minute. The courses are all so arranged as

to 'break joints;' that is, the joints between no two courses are directly opposite each other. The courses being all set up, if we look through the holes we shall see that, although they come very well in a line, there are some little irregularities—a very slight variation in each plate becoming quite noticeable when multiplied by the whole eleven. This is very easily remedied by means of a steel instrument called a 'reamer'—a bit, in fact, with two sharp edges. This is passed through the whole length of the hole, and turned about, trimming off all the irregularities, and making the hole as smooth as the bore of a gun. Our turret is now set up and finished, with the exception of the fixtures and the portholes for the two guns. These are to be drilled out of the solid mass, and the edges of the plates properly secured. Each plate has of course been numbered—'Plate 1, Course 1,' and so on through the whole series, 242 for each turret, if we count correctly; so that, having been taken down, they can be readily set up on board the vessel itself in just the same order. On the vessel the turret rests upon a circular base of brass, which revolves upon a similar plate upon the deck, by means of a shaft worked by a steam engine."

"And where is Captain Ericsson during all this hard and busy work?"

"He was in every part of the vessel apparently at the same moment, skipping over planks and gangways, and up and down ladders, as though he were a boy of six-

teen. It seemed as though a plate could not be placed or a bolt struck without his making his appearance at the workman's side."

Thousands of people went to look at the strange metallic craft, taking form under the blows of hundreds of strong arms.

CHAPTER XVI.

What Visitors said of the Monitor—The Launch—A Memorable Day—The Completed Work—The Vessel manned and at Sea—The Voyage—The Naval Position—The Crisis.

A CURIOUS volume indeed might have been written of the scenes and comments which attended the creation of the silent, gloomy object of wonder. "The *Monitor*, while on her 'ways,' was quite generally regarded as an experiment that would be sure to fail. She was deficient, it was said, in this point and that. She could not carry her weight of armor; her turret would not revolve properly; no living men could work her guns in that narrow space; and, first of all, in the judgment of experienced ship-builders, she could never be launched. There was plausibility in this opinion. The raft-like upper hull, projecting far beyond the lower one, was so loaded with armor as to be far heavier than water, and besides there was the weight of the ponderous turret and the heavy

machinery. This would strike the water first, with nothing to sustain it, and so when the vessel slid from her inclined ways, she would go straight down to the bottom like an iron bar. 'If Ericsson ever finds his battery after she is launched,' it was said, 'he will have to fish her up from the mud, into which her stern will surely plunge.' And so he would have done had she been sent alone from her 'ways.' But this casualty had been foreseen and provided for by Mr. Rowland. Two great wooden tanks had been prepared, which, before the launch, were chained to the almost solid overhanging stern of the upper hull, buoying it up as they touched the water until the lower hull came into the stream. Valves in the tanks were then opened, the water rushed in, sinking them down; then they were disengaged, floated off, and in a quarter of an hour the *Monitor* rested upon an even keel. As we have said, she was launched, contrary to the usual custom, with her engines on board. These had been put in working order beforehand; and as far as the builders were concerned, the battery might have put to sea in half an hour after her launch."

You may be sure there was music to Captain Ericsson's ear in the wild, repeated cheers of the multitude, as the monster glided so gracefully, after all, upon the bosom of the deep, which was yet to hear the monster speak with thunder to echo round the world!

Though there will be a little necessary repetition to

get a clear idea of the monitor, we will describe the vessel as she lies on the tide, attracting unnumbered eyes. The hull or body of it is composed of two separate parts. The lower division, which rests on the water, is 124 feet long, 34 feet wide, and 6½ feet deep. It is made of iron three eighths of an inch thick; that is, it is an iron *canoe* on a large scale, nearly half an inch thick. The upper part is 174 feet long, *jutting over* the other a little, more than 41 feet wide, and 5 feet high. It is built of oak 2½ feet thick, covered on the outside with six inches of iron plates, and on the inside lined with iron half an inch in thickness, to catch the *splinters* in case a ball tears its way into the oak. The deck is solid iron-plating, bomb-proof, and without any railing—indeed almost bare. Under the two layers of iron, each two inches thick, making four inches of metal, is plank eight inches in thickness laid on beams of oak two feet and two inches apart, ten inches square. Only a foot and a half of the entire hull is above water. Then the projecting edges of the upper portion, resembling the eaves of a house, cover and protect the propeller and rudder in the stern, and the anchor in the bow. The locomotive and steering apparatus cannot be reached by an enemy's shot; and the anchor is lifted and lowered out of sight and exposure.

Now take a look at the castle or turret, where the fighting is principally to be done. It is a circular apartment, sixty feet around it, and nine feet high. This is

made of eight layers of iron, each an inch thick, overlapping, and bolted together, and lined with the same metal, making in all nine inches of iron. It weighs about one hundred tons, or two millions of pounds. The covering is of iron and shell-proof, and *perforated* to let in air. It has two large guns, which, when used, are thrown forward by machinery, putting their mouths out of the port-holes, which are near each other on the same side. The recoil, or shock of firing, sends them back to their *den* again, where they are stopped by a clamp, in the right place. The castle, when not needed for battle, rests on a circular bed of composition metal, resembling the rim of a large wheel lying flat, and made fast to the deck. In time of action, by a powerful lever it is lifted upon a shoulder or projection around an iron shaft, and turned by the steam engine, which also works the blowers of the furnaces below. When the command is given to get ready to fire, the iron shutters of the portholes, which slide on the inside, fly open, the lever is touched, the cannons *look* out of the holes, *speak*, and glide back again for a new charge to the enemy. If the direction of the foe is changed, another lever is moved, and round the turret goes till the aim is right, and once more the thunderers march up to the windows, and utter their voices, sending with fiery breath *solid speech* in behalf of peace, over the deep.

The pilot-house, for the helmsman, is built shot-proof

like the turret, with small openings for the outlook, through which, if desirable, musketry can be fired. The low chimneys of the steam engine can be entirely removed, and the smoke escape through flat gratings on the deck. The "blowers," you know, fan the fires without the need of chimney-draft. This makes a clear deck, and so shut up that if an enemy should board the battery he could not get below—all he would find would be an iron-pavement and towers. The sharp iron prow is a powerful ram for crushing against and destroying an opposing vessel, if vulnerable.

"Can a ship be made which *no* cannon ball or bomb shell can pierce?" is a question you may ask. I will give you the opinion of those who know all that can be known until further experiments are tried:

"Whether any thickness of armor can be absolutely impregnable may be a matter of doubt. There is an old paradox of the schoolmen which runs in this form: 'We can conceive of an irresistible force, and also of an immovable body. Now suppose this irresistible force meets that immovable body, what will be the result?' The answer is, that the irresistible force will be resisted, and the immovable body will be moved. A question not unlike this is presented to artillerists and naval constructors of our day: 'Can a gun be constructed which will send a ball through any armor that can be made? and can an armor be constructed which will resist a ball from any

possible gun?' Theoretically, we must answer both of these questions in the affirmative, and so give the paradox: 'We can make armor which will resist any shot, and can make guns that will penetrate any armor.' Practically—the vaunted English experiments of Sir William Armstrong to the contrary notwithstanding—we think the advantage lies on the side of the armor. We believe that our new Monitors will be, for all practical purposes, impregnable. We think the chances are a hundred to one that the turrets which we have described would not be injured by any gun yet constructed; and that, if additional strength should be required to repel an additional projectile force, the thickness of armor can be increased more easily than the projectile force. Theoretically there is no limit to either. Practically, there is a limit to both; and this, we think, will be reached in the case of the cannon sooner than in that of the armor."

You may live to see the question answered in the progress of invention. When you reflect that men are living who saw the first steamer on any waters, and how *fast* the world is moving, it will make you feel that the world's Creator and Guardian alone can tell us the wonders of science to come.

The hand of Captain Ericsson alone had prepared nearly three thousand diagrams and models of the ship's various parts in the course of its construction. The cost was fixed by Congress at $175,000. The next thing to

be done for the Monitor was to *man* her—in other words, put on board the officers and crew. Lieutenant J. Lorimer Worden was appointed commander, and Allan C. Stimmers, engineer.

These officers, with the necessary number of subordinates to manage the curious vessel, were ready to leave the moorings on the 6th of March, 1862. The gunboats *Sachem* and *Currituck* were to be the companions of the *Monitor*, and tow her to the ocean-field of action.

CHAPTER XVII.

The Merrimac leaves her Moorings—The Jamestown and Yorktown—The Naval Raid—The Fearful Struggle—Undying Heroism—The Ocean Scene of Destruction—The Closing Day.

WE turn now to the Southern scene of preparation for the *Monitor*, although the rebel actors there did not dream of such a visitor. I will give you a good account of this from the pen of a popular writer, who made himself familiar with all the incidents of the treasonable work:

"Upon the burning and evacuation of the Norfolk Navy Yard, the steam frigate *Merrimac* was scuttled and sunk by order of Commodore McAulay. This was one of the most magnificent ships in the American navy, being rated as a forty-gun frigate, of 4,000 tons burden. She was built in Charlestown, Mass., in 1856, and was considered one of the finest specimens of naval architecture then afloat. She was 281 feet long, 52 feet broad, and drew 23 feet of water. Her engines were of 800 horse power, driving a two-bladed propeller, 14 feet in diam-

eter, and so adjusted as to be raised from the water when the vessel was driven by wind alone. Her armament consisted of twenty-four nine-inch shell guns, fourteen eight-inch, and two one-hundred-pound pivot guns.

"This magnificent structure was raised by the rebels and cut down, leaving only the hull, which was exceedingly massive and solid. Over this they constructed a sloping shield of railroad iron, firmly plated together, and extending two feet under the water. Its appearance was much like the slanting roof of a house, set upon a ship's hull, like an extinguisher—the ends of the vessel, fore and aft, projecting a few feet beyond this roof. The gun-deck was completely enclosed by this shield, and nothing appeared above it but a short smoke-stack and two flagstaffs. The weight of iron was so immense that the ship nearly broke her back in launching; but the fracture was repaired. The fact that such a formidable mailed battery was in preparation, was well known at the North, and her speedy appearance was daily predicted by the press.

"About noon of Saturday, the 8th of March, 1862, this monster was seen coming around Craney Island, from Norfolk, accompanied by two other war vessels, the *Jamestown* and *Yorktown*, both formerly passenger steamers, running between New York and Richmond, and subsequently altered into rebel war steamers. These were followed by quite a little fleet of armed tugs and

war craft. The monster *Merrimac*, with her imposing retinue in train, headed for Newport News, where there was a national garrison, guarded by the sailing frigates, the *Cumberland*, of 1,726 tons, and the *Congress*, of 1,867 tons burden. Both of these fine frigates were at anchor within half a mile of the shore battery. The crew of the *Congress* had recently been discharged, and three companies of the naval brigade were manning her temporarily, until she could be relieved by the *St. Lawrence*, which was then at anchor in the Roads. As both the *Congress* and the *Cumberland* were merely sailing vessels, they were much at the mercy of their steam opponents.

"The *Merrimac* steamed majestically along, as if conscious of resistless strength, and, as she passed the *Congress*, discharged a single broadside into the doomed ship, and then leaving her to the attention of the *Jamestown* and *Yorktown*, made directly for the *Cumberland*. When the *Merrimac* was within a hundred yards of the two frigates, they both discharged their tremendous broadsides against her armor. The mailed monster quivered a moment under the fearful concussion, but every ball glanced from her sloping shield, like the wooden arrows of the Indian from the hide of the crocodile. Her ports were all closed. Not deigning to pay any attention to the fierce but harmless assault of the two frigates, she rushed straight for ward upon her prey.

"The formidable national battery at Newport News opened with all its massive guns, at point-blank range, and these solid shot and shells also glanced harmlessly away. On rushed the silent *Merrimac*, with not a soul on board to be seen, true as an arrow, and, with all the power of her irresistible weight, plunged headlong, with a fearful crash, into the side of the helpless frigate. The iron prow of the assailant struck the *Cumberland* amidships, crushing in her side with a mortal gash. Then, reversing her engine, and not even annoyed by the cannon balls rattling against her impervious mail, she retraced her steps a few rods for another butt. As she drew back she turned her broadside to the wounded victim, and hurled into her bosom a merciless volley of shot and shells. It was a terrible discharge from hundred-pound Armstrong guns, every shot of which, at that distance, would have pierced the armor of the *Warrior*, of England, or the *La Gloire*, of France. The ponderous missiles tore through the crowded ship, hurling her massive guns about her decks, and scattering mutilated bodies in all directions. Again gathering headway, she crowded on all steam and made another plunge at the *Cumberland*. She struck directly upon the former wound, and crushed in the whole massive oaken side of the ship, as if it had been a lattice-work of laths. Timbers as strong as nature and art could make them, were snapped and crushed like dry twigs. But the *Cumberland*, though overcome, though helpless as a

babe in a giant's arms, was not vanquished. Bravely her heroic crew, under the command of Lieutenant George M. Morris, fought as against fate itself. No gun was silent that could speak. With courage and coolness unprecedented, they took the most careful aim, attempting to penetrate the portholes, the only vulnerable point of their terrible adversary. The smoke-stack of the *Merrimac* was riddled with their shot; the flag-staff shot away, and her anchor bent as if it had been moulded from lead, but the iron-cased battery scarcely showed a scratch. The crew of the *Cumberland* seemed inspired with a supernatural desperation. When all hope was gone, they still with one voice vowed that they would never surrender the *Cumberland* to the rebels, and heroically their guns reiterated the vow, as the ship settled deeper and deeper in the engulfing wave. From lip to lip the cry passed along the deck, 'The ship is sinking.' Yet not a man left his gun; not a white flag was waved; no hand moved to draw down our national banner before the detested rebel flag, terrible as was the power which rebellion now developed. Not a man turned his eye toward the life-boats for escape. One sentiment glowed in every heart: 'Honor the flag.' One sentiment burst from the lips of all, even from those who were strewed in mutilation over the decks—their life-blood fast ebbing—and that utterance was: 'We will never surrender!' Heroic men! greater in defeat than you could possibly have been in victory.

"Rapidly the ship settled in the waves. The water began to swash over the upper deck, and still every unsubmerged gun was hurling defiance at the foe. The ship careened upon one side. The last gunner, knee-deep in water, pulled the trigger of the last gun, and the dying words of the *Cumberland* were uttered. There was a whirl, a plunge, a boiling cauldron of air-bursting billows, and the majestic frigate, with all her dead and all her wounded, sank like lead. A few feet of her topmasts rose above the wave, and there the 'Stars and Stripes still floated, victorious in death.'"

The following list of officers is the *Cumberland's* "roll of honor," names of men who have no superiors on war's historic page, in that martial bravery which inspires the less conspicuous heroes in the ranks: Commander, Lieutenant George M. Morris; Lieutenant and executive officer, H. V. Davenport; Lieutenant, T. O. Selfriades; Surgeon, S. Jackson; Assistant Surgeon, W. W. Leavitt; Paymaster, C. Burt; Chaplain, J. Lenhart; First Lieutenant of Marines, C. Hayward; Boatswain, E. B. Beal; Gunner, G. Mack; Carpenter, W. M. Leighton; Sailmaker, D. Bruce. These defenders of the national ensign, like Lawrence, if they did not shout in death, "Don't surrender the ship!" *acted* out the sentiment with equal gallantry till that banner fluttered over the good ship's watery grave. Not alone went down that shattered vessel. Upon and between her decks were the gory and

ghastly dead, unheeding the tragedy. Their coffin was the noble *Cumberland*, and their sepulchre the sea they loved, and which had upborne the theatre of their valor. But around the calm sleepers were scores of torn warriors, whose life remained in the grasp of suffering—the red current ebbing, and yet they uncomplaining. The dead and wounded numbered nearly a hundred, all beneath the tide, which soon quenched the flickering light of life. Around that signalled burial were adrift hundreds of seamen, many of them stained with their own blood. Crimsoned fragments of the wreck were mingled with these forms of life. But look toward the shores, and watch the boats darting from all points over the waters to rescue the imperilled throng.

Meanwhile there is another scene of fearless daring and noble sympathy, which casts beautiful light upon the gloomy aspect of war. The propeller *Whilden*, which had been moored under the guns of Newport News, half a mile distant, starts the iron paddles and pushes into the range of the enemy's fire, either to save some of the crew or go down beneath the heavy shot. Without a fear or care beyond his mission of mercy, Captain William Riggins steers directly for the struggling multitude. The foe seemed to recoil from assailing the messenger of humanity in his power, and not until the last man is picked up and taken on board did he venture to express his hate. Then a single ball from the *Merrimac* pierces

her boiler, and she is left to regain the harbor, crippled but not destroyed. The deadly and complete work of the mailed giant has occupied only forty-five minutes.

The exultant enemy's next target for the hot ordnance was the *Congress*. The crew was incomplete, and the hopelessness of encounter, together with that consideration, led the commander to attempt an escape. Sails were spread, and the grand representative of the navy of the past moved rapidly over the tide. There was a prospect of keeping out of the *Merrimac's* way, for she could no more stand before her solid prow and protected guns, than a summer dwelling could resist the "artillery of heaven." The thunder-cloud's bolts would no more certainly pierce and burn, than the cannon-shot of the rebel steamer, if once within reach of the *Congress*. A few moments only did the proud ship walk the waters. She struck a sand-bar, and the sails idly hung around her masts. The gunboats *Jamestown* and *Yorktown*, which steamed around the arena of conflict, to open fire whenever it promised success, approached the *Congress* and opened their guns upon the frigate. The man-of-war replied with broadsides, which compelled the assailants to retire till the *Merrimac* could come to their help. They did not wait long. The champion of treason defied the navy of the Republic. The *Congress* hurled her shot from the flaming lines of port-holes in vain. The challenging foe chose deliberately the position most favorable, regardless

of the ponderous hail. When ready for the contest, with the voice of thunder the *Merrimac* poured shot and shell upon the *Congress*, in a storm which paused not for the harmless rattle of balls upon an unyielding coat of mail. The gunboats, emboldened by the damaging fire of the leader in the conflict, rushed upon the foe, the more willing to join in the fierce onset because of the first repulse. They came up on different quarters, and with other rebel ships fairly piled the red-hot missiles of destruction upon the frigate's deck. Crash, crash went these metallic globes through mast, sides, and deck, and through ranks of brave men. Limbs and flesh were carried away, until the shattered planks ran blood, and fragments of palpitating, dying men lay on every side. The heavy cannon were lifted from their carriages and rolled among the slain gunners. Then rose from three different parts of the vessel tongues of flame. The frigate was on fire! The rising wind fell on the centres of ruin, and upward flashed in grand and awful columns the devouring element. The dry wood of the ship's frame was tinder for the conflagration, which in a brief time swept over the entire circle of death. Still the Star-spangled Banner was kept flying. But when the flames began to lay their burning fingers on the wounded, who were compelled to answer to the touch with a groan, then the uninjured survivors could no longer bear the sight. They looked up to the old flag, and down upon their comrades, while tears fell

on the heated deck. To burn alive the helpless and bleeding was more than their stout hearts could let the fires kindled by rebel cannon do, even under the country's banner. The colors were struck. Then a tugboat from the enemy's fleet was sent to rescue the prisoners from the red billows, more dreadful than those amid which the noble frigate had wrestled victoriously. Our sharpshooters sent Minnié bullets whistling among the crews which manned the ships of treason. This maddened the foe, and to avenge the injury the *Merrimac* poured another volley into the *Congress*, dealing death on every hand. The barbarity of the deed is apparent. The white flag streamed from the mast, and an officer waived his white handkerchief from her crimson and flame-wrapped deck. The officers fell into the hands of the traitors, and the rest of the ship's crew reached the shore in their boats. The abandoned man-of-war was a pyramid of flame.

Leaving it the *Merrimac* turned her prow toward the *St. Lawrence* and *Minnesota*. These frigates, too, were fast in the ocean-sands, and at the mercy of the antagonist, hastening to the prey. Quite reckless of exposure, and sure of easy conquest, the monster went near the helpless men-of-war before firing a gun. The *Minnesota* opened her large guns upon the daring *Merrimac*. The impetuous charge upon the iron-clad so close upon her, told upon the triumphant invader. There was a pause, an

appearance of trouble in the craft. Whether or not through the port-holes balls found their way, doing damage, we cannot tell. The sun was sinking and the Union ships were fast. So the rebel champion decided to rest, and make a morning pastime of finishing the frigates. Proudly retiring from the battle plain the *Merrimac* steamed back to moorings behind Craney Island. We can imagine the congratulations which passed from lip to lip in that dark ship, and the vain-glorious boast of the next day's achievements. Meanwhile the *Congress* burned on, the crackling pile contracting in the embrace of the devouring element. The night darkened around it, giving awful sublimity to the scene. The beacon light of heroism, and at the same time the torch of civil war, cast its ruddy glow upon charred and floating timbers, the blood-tinged waters, and the silent but impatient foe, waiting for the dawn to renew the combat. At midnight the fire reached the magazine. Then a volcanic burst of fiery fragments of the frigate's hull, a sound of earthquake-thunder, and the air was filled with a shower of brands and furnace sparks, falling upon the ocean's surging breast. Oh! what a scene for loyal eyes! What a darkness was that which followed the last flame which went out in the waters! Every Union heart in that fleet and in the fortress of Hampton Roads throbbed with despair. There was no gleam of hope. The *Merrimac* was impervious to balls, and could go where she pleased. In

the morning it would be easy work to destroy our whole fleet. She could then shell Newport News and Fortress Monroe at her leisure, setting every thing combustible in flames, and driving every man from the guns.

"As the news of the terrible disaster was flashed over the country by the telegraphic wires, all faces wore the expression of consternation. At Washington Congress was in session. The panic cannot be described. There was really nothing to prevent the *Merrimac* from ascending the Potomac and laying the Capital in ashes, providing there was depth of water to float the steamer, and no one knew whether there was this depth or not, for no one knew the draft of the *Merrimac*. Baltimore, Philadelphia, New York, Boston, and Portland, were in a state of terror. The *Merrimac* could laugh at forts.

The experiment of an hour had wrought an entire change in naval architecture and in defensive fortifications throughout the world. Wooden frigates had almost ceased to be of any value. The blow which had struck the *Cumberland* demolished also the fleets of England and France. All navies went down with that frigate in the abyss together. It is not too much to say, that such a night of anxiety, of terror, of bewilderment, as followed the triumphant return of the *Merrimac* to her anchorage behind Craney Island, this world has seldom witnessed before.

There is no explanation of the mystery of our naval condition. Part of the ships were aground, and in spite of warnings that danger was lurking in rebel waters, we were unprepared for the onset, which well-nigh laid our navy at the feet of Jefferson Davis.

The poet Boker has a ballad on the Cumberland, of stirring interest:

ON BOARD THE CUMBERLAND, MARCH 7TH, 1862.

"Stand to your guns, men!" Morris cried.
Small need to pass the word;
Our men at quarters ranged themselves
Before the drum was heard.

And then began the sailors' jests:
"What thing is that, I say?"
"A 'long-shore meeting-house adrift
Is standing down the bay!"

A frown came over Morris's face;
The strange, dark craft he knew;
"That is the iron *Merrimac*,
Manned by a rebel crew.

"So shot your guns, and point them straight;
Before this day goes by,
We'll try of what her metal's made."
A cheer was our reply.

"Remember, boys, this flag of ours
Has seldom left its place;
And when it falls, the deck it strikes
Is covered with disgrace.

"I ask but this, or sink or swim,
Or live, or nobly die,
My last sight upon earth may be
To see that ensign fly!"

Meanwhile the shapeless iron mass
Came moving o'er the wave,
As gloomy as a passing hearse,
As silent as the grave.

Her ports were closed, from stem to stern
No sign of life appeared.
We wondered, questioned, strained our eyes,
Joked—every thing but feared.

She reached our range. Our broadside rang,
Our heavy pivots roared,
And shot and shell, a fire of hell,
Against her sides we poured.

God's mercy! from her sloping roof
The iron tempest glanced,
As hail bounds from a cottage thatch,
And round her leaped and danced.

Or when against her dusky hull
We struck a fair, full blow,

The mighty, solid iron globes,
  Were crumbled up like snow.

On—on—with fast-increasing speed
  The silent monster came;
Though all our starboard battery
  Was one long line of flame,

She heeded not, no gun she fired,
  Straight on our bow she bore;
Through riving plank and crushing frame
  Her furious way she tore.

Alas! our beautiful trim bow,
  That in the fiercest blast
So gently folded back the seas,
  They hardly felt we passed.

Alas! alas! my *Cumberland*,
  That ne'er knew grief before,
To be so bored, to feel so deep,
  The tusk of that sea-boar!

Once more she backward drew a space,
  Once more our side she rent;
Then, in the wantonness of hate,
  Her broadside through us sent.

The dead and dying round us lay,
  But our foemen lay abeam;
Her open port-holes maddened us;
  We fired with shout and scream.

We felt our vessel settling fast,
  We knew our time was brief:
"The pumps, the pumps!" But they who pumped,
  And fought not, wept with grief.

"Oh! keep us but an hour afloat!
  Oh! give us only time
To be the instruments of Heaven
  Against the traitors' crime!"

From captain down to powder-boy
  No hand was idle then;
Two soldiers, but by chance aboard,
  Fought on like sailor men.

And when a gun's crew lost a hand,
  Some bold marine stepped out,
And jerked his braided jacket off,
  And hauled the guns about.

Our forward magazine was drowned;
  And up from the sick bay
Crawled out the wounded, red with blood,
  And round us gasping lay.

Yes, cheering, calling us by name,
  Struggling with failing breath,
To keep their shipmates at the post
  Where glory strove with death.

With decks afloat, and powder gone,
  The last broadside we gave

From the guns' heated iron lips
Burst out beneath the wave.

So sponges, rammers, and handspikes—
As men-of-war's-men should—
We placed within their proper racks,
And at our quarters stood.

"Up to the spar-deck! save yourselves!"
Cried Selfridge. "Up, my men!
God grant that some of us may live
To fight yon ship again!"

We turned—we did not like to go;
Yet staying seemed but vain,
Knee-deep in water; so we left;
Some swore, some groaned with pain.

We reached the deck. There Randall stood:
"Another turn, men—so!"
Calmly he aimed his pivot gun;
"Now, Tenny, let her go!"

It did our sore hearts good to hear
The song our pivot sang,
As rushing on from wave to wave
The whirring bomb-shell sprang.

Brave Randall leaped upon the gun,
And waved his cap in sport:
"Well done! well aimed! I saw that shell
Go through an open port."

It was our last, our deadliest shot;
The deck was overflown;
The poor ship staggered, lurched to port,
And gave a living groan.

Down, down, as headlong through the waves
Our gallant vessel rushed,
A thousand gurgling watery sounds
Around my senses gushed.

Then I remember little more.
One look to heaven I gave,
Where, like an angel's wing, I saw
Our spotless ensign wave.

I tried to cheer. I cannot say
Whether I swam or sank;
A blue mist closed around my eyes,
And every thing was blank.

When I awoke, a soldier lad,
All dripping from the sea,
With two great tears upon his cheeks,
Was bending over me.

I tried to speak. He understood
The wish I could not speak.
He turned me. There, thank God! the flag
Still fluttered at the peak!

And there, while thread shall hang to thread,
Oh let that ensign fly!

The noblest constellation set
Against our northern sky.

A sign that we who live may claim
The peerage of the brave;
A monument, that needs no scroll,
For those beneath the wave!

CHAPTER XVIII.

The Monitor's Voyage—The Night Glimpse of Her arrival by the Anxious Garrison—The Impressions of an Eye-witness—The Morning Scenes—The Awful Interest felt in the Battery—The Wonderful Providence—The Sabbath—The Combat.

THE first day, Thursday, March 6th, was bright and calm on the deep. The *Monitor*, a little castle resting on an iron base running to a point at each end, cut her way through the waters as if she and old Ocean were familiar friends. She seemed entirely *at home*. You cannot imagine the deep interest with which the commander and engineers watched her motions. They paced that metallic deck, observing with care the sailing qualities of the plain republican craft, whose destined and immortal part in the national conflict had no prophet—for none knew her worth or future.

Friday dawned, and soon the wind began to lift the waves. With the increasing gale the billows rushed wildly over the blue domain of fabled Neptune. And now comes a new and severer trial of the *Monitor*—her first

battle, but not with man's weapons of warfare. Only *two feet* of iron separated the deck from the sea when tranquil. See the mad surges come crested with foam, and meeting the low barrier, bury it in a moment, and sweep over every thing but the turret! Even that drips with the angry baptism of the storm. But the waves retire for an instant, revealing the flooded and unharmed *Monitor*, riding the turbulent main. There is, however, a single defect, which awakens some anxiety. The *caulking* of a portion of the deck was imperfect, and the water filters through into the berth deck and engine room. The hours pass, and another trouble interrupts the comfort and darkens the prospects of the voyage. The strap which moved the wheel that turned the *blowers*, whose fans both ventilated the vessel and kept the furnaces burning, broke. Then the coal gas rushed into the engine room, and nearly suffocated the engineers, Stimmers and Newton, and six others. Soon, however, the injury was repaired, and the hum of the blowers cleared the subterranean or *subferranean* apartment, and kindled afresh the fires.

On Saturday the *Monitor* approached Fortress Monroe. The unsleeping garrison of that fortress, as the ten-o'clock bell struck, discerned in the darkness and distance two ships moving toward it. A little later a third was seen between them with a spectral appearance—so unlike any thing before on the deep.

Oh! how they strained the vision to read some token of deliverance in that small fleet.

"It is the *Monitor!*" flies from lip to lip.

"But what can *she* do!" is the great unanswered question. Impressively wrote an eye-witness of this momentous crisis:

"That morrow! How anxiously we waited for it! How much we feared its results! How anxious our Saturday eve of preparation! At sundown there was nothing to dispute the empire of the seas with the *Merrimac;* and had a land attack been made by Magruder then, God only knows what our fate would have been. The *St. Lawrence* and the *Minnesota* aground and helpless, the *Roanoke* with a broken shaft, these were our defences by sea; while on land we were doing all that was possible to resist a night invasion; but who could hope that would have much efficiency! Oh! what a night that was; that night I can never forget. There was no fear during its long hours—danger, I find, does not bring that—but there was a longing for some interposition of God, and waiting upon Him, from whom we felt our help must come, in earnest, fervent prayer, while not neglecting the means of martial defence He had placed in our hands. Fugitives from Newport News kept arriving; ladies and children had walked the long ten miles from Newport News, feeling that their presence only embarrassed their brave husbands. Sailors from the *Congress* and *Cumberland*

came, one of them with his ship's flag bound about his waist, as he swam with it ashore, determined that the enemy should never trail it in dishonor as a trophy. Dusky fugitives, the contrabands came, mournfully fleeing from a fate worse than death—slavery. These entered my cabin hungry and weary, or passed it in long, sad processions. The heavens were aflame with the burning *Congress*. The hotel was crowded with fugitives, and private hospitality was taxed to the utmost. But there were *no soldiers among the flying host;* all in our camps at Newport News and Camp Hamilton were at the post of duty, undismayed, and ready to do all and dare all for their country. The sailors came only to seek another chance at the enemy, since the bold *Cumberland* had gone down in the deep waters, and the *Congress* had gone upward, as if a chariot of fire, to convey the manly souls whose bodies had perished in that conflict, upward to heaven. I had lost several friends there, yet not lost, for they are saved who do their duty to their country and their God. We did not pray in vain—

'The heavy night hung dark the hills and waters o'er,'

but the night was not half so heavy as our hearts, nor so dark as our prospects. All at once a speck of light gleamed on the distant wave; it moved, it came nearer and nearer, and at ten o'clock at night *the Monitor appeared.* 'When the tale of brick is doubled, Moses

comes.' I never more firmly believed in special providences than at that hour. Even skeptics for the moment were converted, and said, 'God sent her!' But how insignificant she looked; she was but a speck on the dark blue sea at night, almost a laughable object by day. The enemy call her 'a cheese box on a raft,' and the comparison is a good one. Could she meet the *Merrimac?* The morrow must determine, for, under God, the *Monitor* is our only hope."

Who can doubt the kind interposition of Him, who, by the gracious lips of our Redeemer declared, "Not a sparrow falls to the ground without His notice," and by Him "the hairs of our head are numbered"—the God of *our fathers.*

The commander of the *Monitor*, Lieutenant J. L. Worden, reported for duty to the *Roanoke.* He was not unknown in the nation's conflict. When Fort Pickens was threatened, he found his way through rebel territory, conveying despatches for reënforcements. He was a hero, ready for any adventure in behalf of the Republic. He received orders to lay beside the *Minnesota*, prepared to try her metal on the defensive, should the *Merrimac* make a night attack.

My reader, think of this scene and the crisis in our history. Just out of sight lay the dread naval Goliah, rejoicing in the anticipation of the havoc a new day—the *Sabbath day*—would bring. Trembling with just alarm,

amid the dying embers of the *Congress*, our remaining crews kept their watch. All hope of escape was centred in that strange little craft. David coming to hurl back treason's proud defiance, is the symbol naturally suggested to the mind.

Who was the father of that small and almost contemptible bark?

It came from the teeming brain of a Swede, who had turned from English scorn and French indifference, to American hospitality and appreciation of inventive genius.

Even here, his success in this last creation of his skill was doubted. Private enterprise and not the Government had, in reality, secured its construction. No man living knew what the *nondescript* could do or *bear*. Two portholes were visible on one side of an iron circular elevation upon the raft, while ten of these grim mouths could speak from the sides of the *Merrimac*.

But this is God's method of sending deliverance; in an unexpected and quiet way, that the praise and glory may be His.

March 9th dawned upon the waters, and on the two combatants, whose smoke curled upward on the vernal air of a cloudless sky. The bloom and fragrance of a southern clime bordered the sea. The eyes of patriotic warriors were fixed upon the horizon in whose golden, sacred light, the rebel war ships lay. At length signs of preparation to renew the attack are discerned in the dis-

tance. Oh, then, what cheerful activity on board the untried *Monitor!* Down go the hatches, deadlight covers are drawn over the vulnerable outlooks, and the iron pavement swept of every thing but the castle and pilot house.

The command for every man to be at his post is promptly obeyed. Then the battery goes to meet the terrible *Merrimac*, a silent, dark, turreted prison, just above the water's flashing mirror. The rebel iron-clad looks like an ice-house as you have seen it, the roof sloping down nearly to the ground, leaving only narrow sides above the earth. The *Jamestown* and *Yorktown* again escort her to the pastime of destroying what was left of our naval force. Tugboats follow in the wake, crowded with spectators from Norfolk, in high spirits over the holiday entertainment before them, which would silence Fortress Monroe, and thrill every loyal heart in the land with dismay and sorrow. Upon the turret of the *Monitor* stand Lieutenant Worden and other officers, scanning with undiverted gaze every movement of the enemy proudly approaching them.

To all beholders it is an hour of awful interest. The stillness of dread suspense seems to brood over the ocean, and haunt like a viewless presence the Sabbath air. With calm determination and hope, the officers and men wait at their stations the moment to decide the question of deliverance or destruction to our shattered fleet. That mo-

ment now comes. A broadside from the *Merrimac* is rained on the *Minnesota*, anchored fast in the sands, into which she ploughed the day before. The frigate's return shot rattles like hail on the roof of her antagonist. Poor victim of treason! all seems over with her now. The crowd on the tugs grow excited and exultant. Fine amusement for the Lord's day is certainly theirs. But now they catch a glimpse of the *Monitor* advancing to share the conflict. Whether to laugh at the "raft with a Yankee cheese-box upon it," or wait for further discovery of the intruder's character, is the curious question which attends the sight of our "forlorn hope." Lieutenant Worden is in the pilot house; the distance is shortened to half a mile between the batteries, and the command to fire sounds on the ear of Lieutenant Green, who commands the gunners, while Engineer Stimmers has his hand on the lever of the revolving turret. A sound of machinery, heard only in the dim apartments of the *Monitor*, and then a voice of thunder; and look! that metallic globe, weighing one hundred and seventy pounds, describes its curve toward the *Merrimac*. It strikes the mailed monster, and a tremor of amazement seems to run through the very frame of the victor.

A moment's pause is followed by a fierce onset upon the despised antagonist. How the iron storm beats upon the little turret, and hisses along the deck! Not a plate yields to the fire. The "cheese box" stands unbroken,

and the "raft" still bears it on the tide. The disappointed and maddened privateer rushes upon the *Monitor*, hoping to crush with her solid prow the stranger daring to dispute her sovereignty of the waters. Lieutenant Worden sends through the tubes to his gunners the order, "Reserve your fire, aim deliberately, and do not lose a shot." It is now a naval duel, the like of which was never seen before. Thunder answers thunder—cannon balls are showered on the *Monitor*, whose massive globes of iron in *pairs* fall on the *Merrimac*. Round and round the rebel battery steams her enemy, and the turret revolves to assist in the aim, sending a shot at every possibly vulnerable point, from the screw and rudder, along her sides to the prow.

Thus hour after hour the fight rages—thousands of patriotic freemen are within their temple gates, all unconscious of the decisive struggle. The mailed ships get in near and final conflict. The guns of the *Monitor* are aimed at the water line—that is to say, just where the ship's side was washed by the sea. A heavy shot takes effect, but how great the damage does not appear.

"Splendid, sir! splendid, sir! You made the iron fly. You cannot do better, but fire as rapidly as you can;" rang the commander's voice down the speaking tubes, on the ear of Lieutenant Green. Back and forth go the tremendous guns on their carriages, pounding away with their balls upon the *Merrimac*. A hundred-pound shot comes

like a ponderous sledge upon the turret, and knocks by the concussion the men from their balance, and that is all. The dash against her sides by the *Merrimac* only resulted in bad bruises on herself, breaking her prow, while the *Monitor's* sharp edges penetrate her coat of mail until the water enters. And now they touch, appearing like living forms of desperate courage, each determined to conquer or perish in the attempt. The *Yorktown* comes to the rescue: the salute of a shot weighing a hundred and seventy pounds disposes of her. Pierced through and through, she withdraws from the scene. The hot muzzles of the ordnance graze each other, and the cloud, echoing with thunder and ablaze with the lightning of battle, wraps the combatants from the view of all spectators of the contest. The ring of metal against metal—the bounding of shot for miles over the waters—continued to signal the undecided struggle. The *Monitor* continues to seek for a weak spot in the *Merrimac's* sides. Look! she has succeeded. There is a rent in the side of the *Merrimac*, and now another, and then is opened still another. The water enters these; the traitorous monster reels before the deadly blows of the *Monitor*. The die is cast, the victory won! The rebel prow is turned again for the moorings, but under circumstances how different from those of Saturday evening! Then the uninjured bark went with a conqueror's air to the night-haven; now *compelled* to go, with smitten crest, the humbled rebel retires. A fare-

well shot unfortunately strikes the pilot-house upon the grated outlook, prostrating in an instant the brave Worden—the particles of iron and powder thrown into his eyes, completely blinding him. He will, doubtless be a life-long sufferer from the injury, but he will be remembered by his countrymen, who have already raised a handsome purse for his material aid. Lieutenant Green, taking his place, pursues the retreating foe for awhile, when it is deemed prudent to stay with the fleet, and let the *Merrimac* go halting, possibly ruined, to her moorings again. Soon as Lieutenant Worden revives and is able to speak, he inquires, 'Have I saved the *Minnesota?*' The response is, 'Yes, and whipped the *Merrimac.*' The reply is that of a true patriot and hero: 'Then I care not what becomes of me.'"

Writes another of this grand achievement: "It was a glorious victory. Thousands and tens of thousands on the shore, from Fortress Monroe, Newport News, and all the rebel batteries, were watching the conflict. No tongue can tell the joy which thrilled the hearts of the national troops at the result. Cheer upon cheer rose from the fleet and from the fortress, and rolled like reverberating thunder along the shores and over the bay.

"The shattered *Merrimac* was soon met by two rebel steamtugs, who took her in their arms, and bore her fainting and dying to Norfolk. Her injuries were vital. After the efforts of months to repair them, she did not

venture to leave her hospital, again to face the foe, until, in the excess of chagrin and despair, she committed suicide.

"The *Monitor* was entirely uninjured. She was struck twenty-two times on all parts of her. The indentations were so slight that a fresh coat of paint almost rendered them invisible, with the exception of the pilot house, where a ball striking, bent and cracked a huge iron beam, nine inches by twelve, pressing it inward one and a half inches. When the prow of the *Merrimac* came in contact with the side of the *Monitor*, an insignificant dent on the outside was the only mark of the encounter. No official report of the losses on board the *Merrimac* was ever published. The Norfolk *Day Book* stated that nine were killed and eleven wounded. Others of the rebel papers denied that there was any loss of life.

"The *Minnesota* was subsequently got off the shoal, having received no material damage.

"Before the *Monitor* sailed, Captain Ericsson told the officers particularly to instruct the men not to be frightened at the terrible concussions of the enemy's balls against the outside of the turret. It might stun, but it would not hurt them. The concussion of shot weighing one hundred pounds, moving at the rate of a third of a mile a second, and striking a hollow, iron-cased chamber, within a foot of a man's head, can hardly be imagined. Cast-iron shot, striking fairly the iron mail, will crumble almost to pow-

der. The *Monitor* carried out fifty *wrought-iron* shot. But orders were issued that they should not be used. They were exactly fitted to the bore of the guns, and it was feared that, by their expansion at the moment of being fired, they might burst the guns. Others were subsequently made a little smaller, which would allow of expansion. The *Monitor* drew but ten feet of water, and could consequently go almost anywhere.

"The night succeeding the battle there was another scene of terror. At midnight the thousands at Fortress Monroe were awakened by fearful cries from the water, of 'Fire! Fire! O God save us!' They rushed to the shore. At a little distance the national gunboat *Whitehall* was all in flames. There were no boats near the camp. There seemed to be no hope for the crew but to be burned or drowned. It was a terrible sight, as the whole scene was illumined as with the light of day by the fire. The balls from shotted guns of the burning steamer were flying in all directions, endangering those who looked on. One shell struck the hospital, causing fearful terror, as the inmates supposed that the dreaded *Merrimac* had returned and was shelling the forts. The conflagration was caused by a red-hot shot which the *Merrimac*, during the day, had thrown through the *Whitehall*, and which had left between the timbers a smouldering spark. Four only of the poor seamen perished in the flames and water. The rest, by God's interposing kindness, suc-

ceeded in reaching the shore. Thus ended this eventful conflict—a battle never to be forgotten, and which inaugurates a new era in naval warfare."

The following description, by one of its officers, of the scene on board the *Congress*, will show the terrible position in which that ship, and its officers and crew, were placed:

"The second shot came into the stern while Captain McIntire and myself were in the captain's cabin, firing from Sharp's rifles into the portholes of the *Merrimac*. The ball passed between the captain and myself, killing a marine who was also there, knocking the captain down, and knocking me against the door of the pantry. The stove was knocked over, and every thing inside broken up. The ball passed along the spar deck, killing Mr. Thomas Moore, acting master. We carried the marine below, and got a pail of water and put out the cabin fire, and went to work again, firing rifles out of the hole the ball made. After exhausting my supply, I went outside, and Mr. Pendergrast asked me, 'Where is Mr. Smith?' I did not know, and I went to look for him, the balls still whistling around me and mowing their way through the ship, fore and aft. Mr. Smith's cap was found by master's mate Baurey, all torn up, and his body was found soon after. We still fought them as well as we could with the two stern chasers; but finding that resistance was useless, we struck our colors at a quarter to four o'clock. The rebel boat *Beaufort* came alongside of us

and said, 'The officers are prisoners, and send the crew ashore,' and waited to burn the ship. The executive officer of the *Congress* demurred to the burning of the ship before the wounded and crew were on shore, and said he shouldn't do it. The ship had then been on fire about an hour. The Indiana Twenty-first regiment were on the sandy beach of the shore, and sending rifle balls thick and fast on the rebel boat; some also hitting our men. The rebel officer, a midshipman, ordered some of the crew on board, and I presume about fifty got on her, but subsequently jumped off and got on the ship again. I then went below to pack up my things—expecting to be a prisoner of war—had them brought on deck, but the rebel was compelled to draw off, in consequence of rifle balls from shore.

"The *Merrimac*, after the *Beaufort* left us, poured in another broadside, killing eight or ten men. I then went below to get the company rolls, and had to wade in blood and water ankle deep to get to the room in which those books were. I found it full of smoke, and considerably broken up, and every thing knocked in pieces. I began to feel along the floor for the roll books, when a shell burst in the cockpit, the pieces flying around like hail. The partition between the rooms, and pieces of furniture, chairs, bureau, &c., broken up by the force of the explosion, completely covered me; but I finally succeeded in getting out with what I went after."

Lieutenant Pendergrast states: "Seeing that our men were being killed, without the prospect of any relief from the *Minnesota*, which vessel had run ashore in attempting to get up to us from Hampton Roads, not being able to get a single gun to bear upon the enemy, and the ship being on fire in several places, upon consultation with Commander William Smith, we deemed it proper to haul down our colors, without any further loss of life on our part. We were soon boarded by an officer of the *Merrimac*, who said he would take charge of the ship. He left shortly afterward, and a small tug came alongside, whose captain demanded that we should surrender and get out of the ship, as he intended to burn her immediately. A sharp fire with muskets and artillery was maintained from our troops ashore upon the tug, having the effect of driving her off. The *Merrimac* again opened upon us, although we had a peak to show that we were out of action. After having fired several shells into us, she left us and engaged the *Minnesota* and the shore batteries, after which the wounded were taken ashore in small boats, the ship having been on fire from the beginning of the action, from hot shot fired by the *Merrimac*.

"The *Cumberland* commenced sinking soon after the second blow was given her. Before the frigate had entirely sunk, they continued to work every gun above the water line. One of her after guns was discharged at the enemy as she was actually going down, prow foremost

She sunk in about forty-two feet of water. She sunk very slowly. There was no effort to escape, no rush to the boats, not a sign of surrender, and, as she settled, her guns were sullenly fought to the last moment, and the national ensign still floated defiantly from its staff.

"The United States steam frigate *Minnesota*, in attempting to come to the relief of the *Congress* and *Cumberland*, grounded; and under the peculiar circumstances of the first day's fight, it probably saved that vessel from sharing the fate of her comrades; for where she lay, the *Merrimac* could not come nearer than one mile of her, and the fire of the former was so inaccurate, that but one of her shots hit the *Minnesota*. The rebel steamers *Yorktown* and *Jamestown*, however, took such position as to escape the sweep of most of the guns of the *Minnesota*, and several of their shots took effect upon her. They continued the fire upon the *Minnesota* about three hours, when they all withdrew toward Norfolk.

"Thus ended the first day's fight. The day closed, indeed, with sadness in the hearts of our officers, besides having the fact resting on their minds that the hostile machine, that had just made such murderous work, had only retired, apparently to recruit itself, and then return to complete the destruction she had commenced, having the sailing vessels here at her mercy. While despondency settled on many brows, and conjectures were rife as to where the *Merrimac* would direct her attention the next

day, a gleam of hope arose. At eight o'clock in the evening a bright, movable light was discovered seaward, coming from the direction of Cape Charles light. It being known that the Ericsson battery had left New York a few days previous, surmises were rife that this light might proceed from her deck. The best night telescopes were brought into requisition, and in less than half an hour after it first hove in sight, the fact was circulated that the Ericsson battery was coming up the Roads. The news spread like wildfire; the ramparts in the fort were soon lined with troops. At nine o'clock the *Monitor* anchored off Fortress Monroe. Lieutenant Commanding Worden immediately reported to flag-officer Marston, and subsequently to General Wool. It was at once determined by those officers to send the battery to Newport News, to protect that post, also to defend the *Minnesota*, which was still on shore. Before she started, an additional supply of ammunition was placed on board, and at half-past eleven o'clock the *Monitor* went on her mission, to await the appearance of things the following day. The arrival of the *Monitor* was, indeed, providential."

Had Captain Ericsson done nothing in all his wonderfully active life but invent this single marvel of naval power, his history and name would merit an imperishable place in our country's annals. How plainly was he God's gift to us! No more certainly were the Mayflower, and George Washington and Abraham Lincoln, guided by

Him, than was the inventor and his invention to deliver our imperilled Republic. The nation was ready to praise both, now success had attended them. Ericsson's name was on every lip.

I saw hanging upon the wall of the pleasant parlor of his residence a beautiful testimonial on parchment, and elegantly framed, from the "Empire State." The form and style of the large and finished engraving I cannot give you; but its contents, which are a fitting and deserved tribute from the commonwealth, in whose chief city, the metropolis of the new world, he resides, and from whose harbor the deliverer of our imperilled navy sailed. In the centre is a fine likeness of Captain Ericsson, and near the lower margin an excellent picture of the *Monitor*.

The following is a copy of the complimentary memorial of the *Monitor's* service, and her inventor's work:

STATE OF NEW YORK,
IN ASSEMBLY, March 13th, 1862.

The recent engagement in HAMPTON ROADS, while establishing the utility and importance of IRON-CLAD VESSELS of war, as equally confirmed the genius of our inventors, and the undaunted gallantry of our naval officers and soldiers: therefore be it

Resolved, That JOHN ERICSSON, in the conception and construction of the steamer *Monitor*, has contributed materially to the protection of our forces on sea and land, and the

effective and speedy prosecution of the war, and is eminently entitled to the THANKS OF HIS COUNTRYMEN.

Resolved, That the devoted bravery and skill of Lieutenant J. LORIMER WORDEN, commander of the *Monitor* in the engagement, the untiring energy of the engineer, ALLAN C. STIMMERS, and the courage and fidelity of the other officers of the crew, challenge our respect and gratitude.

Resolved, That a copy of the foregoing preamble and resolutions, properly engrossed and authenticated, be presented to John Ericsson, Lieutenant Worden, and Engineer Stimmers.

J. B. CUSHING, *Clerk*.

CHAPTER XIX.

A Visit to the Dictator—First Impressions—The Leviathan in repose—The Turret: how it was moved from the Iron Works—The Machinery—The Officers' Quarters—The fighting qualities of the Dictator—Her Equipment and appearance at Sea.

IT was a bright September morning, 1864, when armed with a "pass" from Mr. Samuel W. Taylor, Captain Ericsson's gentlemanly and intelligent secretary, I started for the *Dictator*, lying near Mr. Delamater's iron works at the foot of Thirteenth street, New York. After a glance at the large establishment in which most of the iron-clad's armament and machinery were made, I went on board the floating Gibraltar. Your impression upon stepping on the iron deck, and finding massive metallic plates on every side, from which rises the turret of the same material, is, that the ponderous engine of destruction must sink like a stone in the waters.

But go with me over this hitherto unequalled creation of genius and mechanical skill. The "pass" is directed

to "Mr. Gilbert J. Orr," the superintending engineer. He opens the note, reads, and dismissing the workman to whom he was giving orders, with a quiet smile of welcome, he proposes to examine the turret, which is the object of special interest.

Mr. Orr is a young man, and a native of New York. He was a studious boy, and has patiently won his way to his present high position. He was associated with Captain Ericsson in the construction of his caloric engines, and superintended the building of the iron-clads *Passaic*, *Montauk*, and *Catskill*. Marine machinery is no more to him than toys to a child.

"Mr. Orr, before we enter that circular cannon-house, will you let us survey the features of the giant, and tell us his dimensions?"

"With great pleasure. Step to the bow with me."

We walk over the iron pavement, past heavy chains, wheel, smoke pipe, and busy hands, and stand on the *Dictator's* very brow.

"This you will notice," remarks Mr. Orr, "is the *ram*. It is designed and believed to be invulnerable and formidable as a prow can be made."

Turning toward the stern, Mr. Orr continues:

"It is three hundred and fourteen feet from this point to the extreme one aft. The greatest width is fifty feet, and the depth twenty-two and a half."

It may aid the young reader in getting a correct idea

of these dimensions, to take his own height or that of a tall man measuring six feet, and divide the figures by it. This would give you fifty two men in a row lengthwise, to extend from the prow to the helm.

But Mr. Orr is not done with the outline view of the *Dictator*.

"The armor shelf is four feet wide. Beginning with the outside, there are six one-inch plates of iron—making half a foot of metal. Next to this lies a wall of oak timber, three feet thick, lined between it and the metal with thick felting. The last, or inside part of the armor, is made of iron bars four inches and a half in thickness—making on the armor shelf over ten inches of iron, three of oak, and half an inch of felting. It is certain that no gun yet cast or wrought can pierce it. The ship is divided into water-tight apartments. Two large engines, whose cylinders are one hundred inches in diameter, belong to the propeller. They have six boilers, and are of five thousand horse power. There are in all twelve steam engines on board, and *fifty-six furnaces*."

"Why, sir, have you the ten extra engines?"

"These are for various purposes, as I will soon have the pleasure of showing you. One lifts the anchor, another moves the turret, while still a third turns the blowers; and so with other machinery for working the ship."

"What a floating ark of iron, engines, furnaces, and machinery!" you exclaim. It *is* a naval wonder.

"But let us enter the turret through this porthole, if you will *climb*, rather than walk in," says our attentive guide.

We soon get through the polished mouth from which one of the two tremendous guns is to pour fire and ponderous hail, almost large enough up and down, for it is oval, for you to stand erect in it.

"This turret," continues Mr. Orr, "is fifteen inches thick, and is formed of two separate parts. The inner turret is made of six one-inch plates, for which the outer one is a *sleeve*, with an additional thickness of another coating of metal. Between the two is a lining of solid hoops or bars. The whole makes a great revolving tower, twenty-seven feet in diameter, and weighing about *two hundred tons*."

"And how was it moved from the iron works?"

"The inside turret was first brought on deck, along greased ways, by means of pulleys. It made only a foot or so at each step. But powerful machinery and steady work landed the whole safely here."

Glancing around the interior of this immense turret, you see the levers and wheelwork for turning it and handling the guns connected with the steam engines below. There is a perfectly smooth metallic *shoulder* around the central shafting on which the whole revolves. Indeed, the management of the turret does not materially differ from that of the first *Monitor*.

"If you would like to see the engine room we will descend these steps," says Superintendent Orr, pointing down a steep and narrow stairway, also of iron.

Here we are in the skeleton of the *life-power*. Polished iron shafts, wheels, and levers, massive and quiet—looking like iron freight enough to sink any ship, carefully laid away in the hold, itself a great *iron-safe*. Passing toward the bow, we enter the officers quarters. The rooms are all below the water line, neatly painted, and each furnished with a crib-like berth, and other conveniences, but with no ornaments or luxuries of any kind. I think the first impression upon the mind of one who had seen our finest prison-structures, would be of a *similar home* on the waters. The dining hall and the state rooms are so plain, the light softened down, and a lattice work in each door, while the air of *security* is over all things. The bunks for the common sailors are comfortable, and the entire space below the deck is admirably ventilated. The brave Commodore Rodgers has an apartment differing from other officers only in size, and some trifling extras, indicating the rank of the occupant. He declares that he wishes nothing for show; safety and services in the country's defence is all he seeks. It is no pleasure yacht he is to command, but an honest, unadorned, and kingly worker on the sea—*a Republican Dictator*. Her practical worth on the ocean-plain of battle is yet to be tested. Whatever defects or failures may attend the new

order of things in the navy, the greatness of the revolution attending the inventions of Captain Ericsson, cannot be questioned, and is yet to be more clearly seen and felt over the world. I shall give you the story of a recent and splendid achievement, which, it is just to say, could not have shed lustre on our navy, and immortalized a young hero, had it not been for Captain Ericsson. That is, his *propeller* and other inventions in the armament of war-vessels, were the indispensable means of success. How quietly the little "picket" did its work; "stole the march" upon a formidable foe! We copy from Mr. O. G. Sawyer's despatch:

"HAMPTON ROADS, VA., November 1, 1864.

"The most audacious, brilliant, and successful affair of the war, occurred in the waters of North Carolina last week, in which, after the briefest contest but one, as it will prove of the best results, the rebel iron-clad ram *Albemarle* was effectually destroyed and sent to the bottom by a torpedo discharged by Lieutenant William B. Cushing, of the navy. The great mailed monster that has so long excited the apprehensions of the Navy Department, and held in the Sound a force greatly in excess of that which was usually stationed there, now lies quietly at the bottom of the Roanoke River, a subject of curious contemplation and dread to the fish that frequent those waters. In the squadron every one feels a sense of relief in realiz

ing the fact that the *Albemarle* is no longer afloat, or capable of doing further damage; for it is no secret that she was one of the toughest customers for wooden vessels to confront that has yet floated. Her raid on the flotilla on the 5th of last May proved that fact beyond a shadow of a doubt. She then encountered and fought to great advantage three heavily-armed double-enders—the *Sassacus*, *Matabesett*, and *Wyalusing*—and retired only after a prolonged contest, slightly damaged. While she floated no post held by us and accessible to her was safe. She could go her way as she chose, in spite of the efforts of our wooden vessels, unless some accident occurred to her which should prevent her steaming. None of the light draft *Monitors* were ready to confront her, and she threatened to clear our forces out of the State of North Carolina.

"Such was the state of affairs subsequent to the 5th of May. Our squadron in Albemarle Sound had been largely increased by the addition of several light draught, heavily-armed vessels; but, even with these, it was somewhat doubtful whether the possession of the Sound was insured us. So it was determined to get rid of the monster in some more expeditious and certain way.

"Lieutenant William B. Cushing, a young officer of great bravery, coolness, and resources, submitted a project to Admiral Lee, in June last, by which he hoped, if successfully carried out, to rid the Sound of the *Albemarle*,

and insure us its possession. Admiral Lee entered warmly into the scheme, as did the Navy Department, which immediately detached Lieutenant Cushing from the *Monticello* and placed him on this special duty, at the same time giving him every facility to carry out the object in view.

"Lieutenant Cushing at once proceeded to New York, and, in conjunction with Admiral Gregory, Captain Boggs, and Chief Engineer William W. W. Wood, arranged one of the new steam picket boats, which is about the size of a frigate's launch, with a torpedo arrangement, and then took her down in the Sound for duty. Having made several reconnoissances up the Roanoke River, which gave him some valuable information, and having perfected his arrangements, on the night of the 27th ultimo he got under way from the squadron off the mouth of the river and steamed boldly up the river. In the steam launch were Lieutenant Cushing, Paymaster T. H. Swann, a volunteer from the *Otsego*, and Master's Mate W. L. Howorth, of the gunboat *Monticello*, and Third Assistant Engineer Stolsbury, in charge of the engine, with a crew of ten men, nearly all of whom volunteered for the service. An armed cutter of the *Shamrock*, with an officer and ten men, was towed along, for the purpose of attending to some of the minor details of the work. It was known that the enemy had pickets along the river banks, and on the wreck of the gunboat *Southfield*, sunk

by the *Albemarle* last spring, and which laid about a mile below the town of Plymouth. The pickets, who were in the habit of stationing themselves on the hurricane deck of the *Southfield*—the only portion of the wreck above water—were to be turned over to the care of the *Shamrock's* cutter when the proper time came, while those along the river were to be passed in silence, and without giving alarm, if possible.

"At about midnight the little picket boat entered the narrow river, and steamed cautiously and silently up without giving the least alarm. The *Southfield* and three schooners alongside of her engaged in raising her up, were passed at a short distance—almost within biscuit toss—without a challenge or hail. It was not until Lieutenant Cushing reached within pistol shot of the *Albemarle*, which lay alongside the dock at Plymouth, that he was hailed, and then in an uncertain sort of way, as though the lookouts doubted the accuracy of their vision. He made no reply, but continued to press toward the rebel monster, and was for the second time hailed. He paid no attention to the challenge, but kept straight on his way, first detaching the *Shamrock's* cutter to go below and secure the rebel pickets on the *Southfield*.

"In another instant, as he closed in on the ram, the rebel Captain Walley, in a very dignified, pompous, studied manner, shouted, 'What boat is that?' The reply was an invitation for him to go to blank! There-

upon arose a terrible clamor. The rattle was vigorously sprung, the bells on the ship were sharply rung, and all hands were called to quarters, evidently in great consternation and some confusion. A musketry fire was immediately opened upon the torpedo boat, and a charge of canister was fired, injuring some of the crew. Along the dock to which the *Albemarle* was tied were a large number of soldiers, evidently stationed there to guard against a landing of our force after a surprise. And in front of their lines blazed cheerily up a number of camp fires, which threw a strong light upon the rebel vessel and the bosom of the river. By the aid of this glare Lieutenant Cushing discovered the pier of floating timbers which surrounded the ram on the accessible sides, to guard against the approach of rams and torpedoes. And by the aid of the same light he plainly saw the large body of soldiers thronging to the wharf and blazing away at his boat. To quiet these fellows he brought the bow of his boat around a little, and discharged a heavy stand of canister into them from his twelve-pounder howitzer mounted at the bow, and sent them flying. Making a complete circle, under a scorching musketry fire at less than thirty yards, he came around, bow on, at full steam, and struck the floating guard of timbers, pressing them in toward the hull of the ram. His boat soon lost headway, and came to a stand still, refusing to back off or move ahead. The moment for decisive action had now arrived. The enemy fired

muskets and pistols almost in his face from the ports of the ram, and from the hundred small arms on shore. Several of his men were wounded, and Paymaster Swann had fallen severely wounded. The officers and crew of the *Albemarle* cried out, 'Now we've got him; surrender, surrender, or we will blow you to pieces.' The case looked desperate indeed; but Lieutenant Cushing was as cool and determined at the moment as one could be under the most agreeable circumstances. He knew that the decisive moment had come, and he did not allow it to glide from his hands. He seized the lanyard to the torpedo and the line of the spar, and crowding the spar until he had brought the torpedo under the overhang of the *Albemarle* he detached it by one effort, and the next second he pulled the lanyard of the torpedo and exploded it fairly under the vessel on her port side, just below the porthole of the two hundred pounder Brooke's rifle, which at that moment was discharged at the boat. An immense volume of water was thrown out by the explosion of the torpedo, almost drowning all in the boat; and to add to the peril of the moment, the heavy shell from the enemy's gun had gone crushing through the bottom of the boat, knocking the splinters about in a terrible style. She at once began to sink in the most rapid manner, and Lieutenant Cushing ordered all hands to save themselves as best they might. He divested himself of his coat and shoes, and plunged into the river, followed by those of his men who

were able to do so. All struck for the middle of the river, under a hot fire of musketry, the balls perforating their clothing and striking all about them, and in two or three instances, it is feared, so badly wounding the swimmers that they sunk before boats from the shore could reach them. Lieutenant Cushing heard the rebels take to boats and push after the survivors, demanding their surrender. Many gave up, but two of the seamen were drowned near by him—whether owing to wounds received or exhaustion he could not state. Paymaster Swann was wounded and is a prisoner; but how many others fell into the rebel hands has not as yet been ascertained. Lieutenant Cushing swam down the river half a mile, until, exhausted and chilled by the cold water, he was compelled to struggle to the shore, which he reached about daylight. After lying in the weeds along the river bank for some time, he recovered his strength sufficiently to crawl into the swamp further till daylight found him lying in the swamp grass, between two paths, and in speaking distance of the enemy's fort. While lying there but partially screened by this low sedge, he saw some rebel officers and men walk by, and heard their conversation, which was entirely devoted to the affair of the morning. From their remarks he learned that the torpedo had done its work effectively and thoroughly, and that his great object was accomplished. He did not learn any of the details of the sinking, but heard it stated that the ram had gone down by her dock,

and was a complete loss. He also learned of the capture of the paymaster and some others of his crew from the same source.

"Finding that there was great danger of his detection if he remained in his exposed position all day, lying within a few yards of two frequented paths, and so near the river, he began to move slowly away toward the swamp. He was obliged to move cautiously, so he laid on his back, and by pushing his heels into the ground he slowly pushed himself along, and after a long and exhausting effort passed over the sixty yards of ground that laid between him and better cover. Once concealed, he laid up for the day and rested himself. He was fortunate enough before midnight to get hold of a negro, whom he sent into town to learn the extent of his success. The negro obeyed his instructions, and reported that the *Albemarle* was out of sight—'Clar gone sunk.'

"At night Lieutenant Cushing struck through the swamp, and after the greatest and most exhausting toil and pain—as he was in his stocking feet, and continually plunging over roots, briers, logs, oyster shells, and lacerating his flesh severely, he reached a point six miles below the town, where he discovered a skiff used by a picket. Watching his chance he seized this, and with a single paddle, paddled off to the squadron twelve miles distant, which he reached in safety. Only one beside himself—William Hoften, a sailor on the Chicopee, who

had volunteered on the occasion—returned to the squadron. He was picked up by a boat and sent off when nearly exhausted.

"Lieutenant Cushing immediately came here on the special despatch boat *Valley City*, and reported to Admiral Porter. To night he will go to Washington and report to the Department. He is worn out and in need of rest, which we hope he will be permitted to enjoy.

"This last brave and gallant action of his is likely to gain him an advance of one grade in his rank, and it will also, if the law is rightly construed, be apt to prove a great financial success, which is somewhat more substantial. His share of the prize-money from the *Albemarle*, if she is fairly placed at a valuation, would be in the neighborhood of fifty thousand dollars—an acceptable sum to any one. Lieutenant Cushing has again been ordered to the command of the gunboat *Monticello*, which will await him until his return from a short leave.

"The destruction of the *Albemarle* will release the large squadron of powerful light-draught vessels which have, since her debut last May, been maintained in the Sound. They can go elsewhere now.

"On a reconnoissance made by the *Valley City* to within a mile of Plymouth, it was discovered that the enemy had sunk the schooners which were engaged in attempting to raise the *Southfield* directly across the channel, thus temporarily blockading the river. Although the town was in

sight, not a trace could be seen of the rebel ram, and it is proved in other ways, beyond a doubt, that she lies in thirty feet of water, from which it will be impossible to raise her again.

"Captain Walley, who had assumed command of the ship only three weeks ago, relieving Captain Cooke, who commanded her in the action of May last, began his duties in a very bombastic style. He mustered his officers and men, and assured them that in three weeks he would again attack the enemy and sink and scatter his fleet, and then he would retake Newbern and drive the Yankees from every foot of North Carolina soil. With the *Albemarle* and their aid, with the coöperation of the gallant army, he would, before the new year, regenerate the State, and leave not a trace of a Yankee within its borders.

"It is not improbable that he might have effected a good deal of damage, and perhaps have endangered for the time being our tenure at Newbern and Roanoke Island, as he was nearly ready for his raid. Thanks, however, to the gallant Cushing and his brave comrades, through whose coolness, courage, and skill the *coup de main* was so admirably administered to the mailed monster, all danger has passed, and another destructive blow has been given to the declining rebel navy.

"A meed of credit and praise should be awarded to Chief Engineer Wm. W. Wood, of the navy, to whose

inventive abilities and experience in submarine warfare we owe the contrivance of the torpedo and the successful arrangement by which it is handled and exploded. The one fired by Lieutenant Cushing contained but fifty pounds of powder; but it did its work to a charm. There was no chance of its failing in his hands. The entire arrangement is exceedingly ingenious, and it would be manifestly improper to describe it at this time.

"The *Albemarle* was an iron-cased vessel, similar in general features to the *Merrimac* and *Tennessee*, but much stronger. It is said that her iron mail was twelve inches in thickness, and backed by several feet of solid timber. She was armed with two two-hundred pounder Brooke rifles, and was perfectly shot proof. Her weak point proved to be below. She could have been captured only by ramming, and for that purpose much heavier vessels were needed than any that could be got into the Sound. The torpedo was the only means of destroying her, and that proved successful when tried.

"The *Albemarle* is probably the last formidable vessel that the rebels have in the inland waters of North Carolina, and they will hardly have an opportunity of building more."

The Secretary of the Navy wrote a letter to young Cushing, which ought to encourage all boys who have a noble ambition to be useful as patriotic citizens:

"NAVY DEPARTMENT, WASHINGTON, Nov. 9, 1864.

"Sir: Your report of October 30th has been received, announcing the destruction of the rebel iron-clad steamer *Albemarle*, on the night of the 27th ult., at Plymouth, N. C.

"When last summer the Department selected you for this important and perilous undertaking, and sent you to Rear Admiral Gregory, at New York, to make the necessary preparations, it left the details with yourself to perfect. To you and your brave comrades, therefore, belongs the exclusive credit which attaches to this daring achievement.

"The destruction of so formidable a vessel, which had resisted the combined attacks of a number of our steamers, is an important event touching our naval and military operations. The judgment as well as the daring courage displayed, would do honor to any officer, and redounds to the credit of one twenty-one years of age.

"On previous occasions the Department has had the gratification of expressing its approbation of your conduct in the face of the enemy, and in each instance there was manifested by you the same heroic daring and innate love of perilous adventure—a mind determined to succeed and not to be deterred by any apprehension of defeat.

"The Department has presented your name to the President for a vote of thanks, that you may be promoted one grade, and your comrades shall also receive recogni-

tion. It gives me pleasure to recall the assurance you gave me at the commencement of your professional career, that you would prove yourself worthy of the service to which you were appointed.

"I trust you may be preserved through further trials; and it is for yourself to determine whether, after entering upon so auspicious a career, you shall, by careful study and self-discipline, be prepared for a wider sphere of usefulness on the call of your country. Very respectfully,

"(Signed) GIDEON WELLES,

"*Secretary of the Navy.*

"Lieut. W. B. CUSHING, U. S. N., Washington."

CHAPTER XX.

The Propeller in the Navy—The interesting variety of Names—The Pay of Officers and Men—The Stromboli—The new Cassabianca.

IT will interest the reader to see what Captain Ericsson's propeller has done for the navy, apart from the decisive battles on the sea. I will give you a glimpse of the wonderful change since the *Princeton* was launched in 1843. The names will furnish the reference, if you wish to know about any vessel noticed in the annals of the war. The list includes only screw steamers, of course.

SCREW STEAMERS.

Alleghany, - -	10 guns.	Antona, - - -	5 guns.
Anacostia, - -	4 "	Arkansas, - -	5 "
Aroostook, - -	7 "	Arapoho, - -	8 "
A. C. Powell, -	1 "	Aries, - - -	7 "
Albatross, - -	6 "	Aug. Dinsmore,	2 "
Acacia, - - -	— "	Brooklyn, - -	24 "
Alert, - - -	2 "	Bermuda, - -	3 "
Ammonoosuc, -	— "	Colorado, - -	52 "
Antietam, - -	20 "	Canandaigua, -	10 "

Crusader,	7 guns.	Farallones,	6 guns.
Cambridge,	10 "	Fuchsia,	3 "
Chippewa,	4 "	Galatæa,	14 "
Chocura,	5 "	Gertrude,	8 "
Ceres,	4 "	Glaucus,	11 "
Cayuga,	7 "	Gov. Buckingham,	6 "
Currituck,	5 "	Grand Gulf,	11 "
Cohasset,	2 "	Guerriere,	20 "
Calypso,	6 "	Hartford,	27 "
Camellia,	— "	Huntsville,	4 "
Carnation,	2 "	Henry Brinker,	1 "
Chattanooga,	— "	Housatonic,	13 "
Circassian,	6 "	Huron,	4 "
Clover,	— "	Hassala,	8 "
Contoocook,	8 "	Hendrick Hudson,	6 "
Dacotah,	7 "	Home,	3 "
Dawn,	5 "	Honeysuckle,	— "
Daylight,	8 "	Howquah,	4 "
Dai-Ching,	7 "	Hydrangia,	— "
Dandelion,	2 "	Iroquois,	8 "
E. B. Hale,	6 "	Itasca,	4 "
Emma,	7 "	Ida,	1 "
Eureka,	— "	Idaho,	8 "
Franklin,	50 "	Illinois,	20 "
Flambeau,	5 "	Iris,	— "
Flag,	8 "	Iron Age,	11 "
Fahkee,	3 "	Juniata,	11 "

Jasmin,	2 guns.	Monticello,	7 guns.
Java,	20 "	Mount Vernon,	4 "
Jonquil,	— "	Monongahela,	12 "
Kearsarge,	8 "	Memphis,	7 "
Kanawha,	4 "	Maumee,	5 "
Kennebec,	5 "	Madawaska,	— "
Kineo,	6 "	Manitto,	8 "
Katahdin,	7 "	Marigold,	2 "
Kansas,	5 "	Mary Sanford,	3 "
Keosauqua,	8 "	Mondamin,	8 "
Kewaydin	20 "	Monterey,	— "
Lancaster,	30 "	Mosholu,	8 "
Leslie,	2 "	Niagara,	32 "
Louisiana,	5 "	Norwich,	6 "
Lackawanna.	14 "	New London,	5 "
Larkspur,	— "	Narragansett,	6 "
Lilac,	2 "	Nipsic,	5 "
Lodona,	7 "	Narcissus,	— "
Lupin,	— "	Neptune,	11 "
Minnesota,	20 "	Nereus,	11 "
Mohawk,	8 "	Neshaminy,	— "
Mohican,	7 "	Newbern,	6 "
Mystic,	7 "	Niphon,	7 "
Marblehead,	6 "	Nyack,	5 "
Massachusetts,	5 "	Oneida,	10 "
Mercedita,	9 "	Ossipee,	13 "
Montgomery,	6 "	Ottawa,	5 "

Owasco,	4 guns.	Seminole,	9 guns
Ontario,	20 "	Sciota,	3 "
Pawnee,	10 "	Seneca,	4 "
Pensacola,	24 "	Sagamore,	4 "
Pocahontas,	7 "	South Carolina,	8 "
Princeton,	— "	Stars and Stripes,	5 "
Pembina,	4 "	Shenandoah,	10 "
Penobscot,	4 "	Sacramento,	10 "
Panola,	4 "	Stettin,	5 "
Penguin,	6 "	Saco,	7 "
Potomska,	6 "	Shawmut,	5 "
Pequot,	11 "	Snowdrop,	— "
Peterhoff,	— "	Sunflower,	3 "
Piscataqua,	20 "	Sweet-Brier,	— "
Pompanoosuc,	— "	Tuscarora,	10 "
Poppy,	— "	Tahoma,	6 "
Primrose,	2 "	Ticonderoga,	10 "
Princess Royal,	7 "	Teaser,	1 "
Proteus,	11 "	Tahgayuta,	8 "
Pushmataha,	8 "	Unadilla,	7 "
Queen,	4 "	Uncas,	5 "
Richmond,	22 "	Union,	1 "
Resolute,	2 "	Valley City,	6 "
Rescue,	1 "	Victoria,	3 "
R. R. Cuyler,	12 "	Vicksburg,	6 "
Rocket,	— "	Violet,	2 "
San Jacinto,	14 "	Virginia,	7 "

Wabash,	47 guns.	Whitehead,	4 guns.
Wyandotte,	5 "	Wampanoag,	8 "
Wyoming,	7 "	Wanaloset,	8 "
Wachusett,	10 "	Watauga,	8 "
Wissahickon,	5 "	Willamette,	8 "
Winona,	4 "	Yantic,	5 "
Wamsutta,	5 "	Young Rover,	5 "
Western World,	5 "	Zouave,	— "

IRON-CLAD STEAMERS.

Agamenticus,	4 guns.	Essex,	7 guns.
Atlanta,	4 "	Eastport,	8 "
Benton,	16 "	Etlah,	2 "
Chilicothe,	3 "	Galena,	7 "
Chickasaw,	2 "	Kickapoo,	4 "
Catskill,	3 "	Kalamazoo,	4 "
Camanche,	2 "	Klamath,	2 "
Cincinnati,	13 "	Kaka,	3 "
Carondelet,	13 "	Louisville,	13 "
Canonicus,	2 "	Lexington,	7 "
Catawba,	2 "	Lehigh,	2 "
Casko,	2 "	Mound City,	13 "
Chimo,	2 "	Marietta,	2 "
Choctaw,	8 "	Milwaukee,	4 "
Cohoes,	2 "	Montauk,	2 "
Dictator,	2 "	Manhattan,	2 "
Dunderberg,	10 "	Mahopac,	2 "

Manayunk - -	2 guns.	Sandusky, - -	2 guns.
Monadnock, - -	4 "	Sangamon, - -	2 "
Miantonomoh, -	4 "	Saugus, - - -	2 "
Modoc, - - -	2 "	Shakamaxon, -	4 "
Mohongo, - -	— "	Shamokin, - -	— "
Muscoota, - -	— "	Shawnee, - -	2 "
Nantucket, - -	2 "	Shiloh, - - -	2 "
Nahant, - - -	2 "	Suncook, - - -	2 "
Neosho, - - -	2 "	Squando, - - -	— "
New Ironsides, -	20 "	Suwanee, - -	— "
Napa, - - -	2 "	Tuscumbia, - -	5 "
Naubuc, - - -	2 "	Tippecanoe, - -	2 "
Nausett, - - -	2 "	Tonawandah, -	4 "
Ozark, - - -	2 "	Tecumseh, - -	2 "
Osage, - - -	2 "	Umpqua, - - -	2 "
Onondaga, - -	4 "	Winnebago, - -	4 "
Oneoto, - - -	2 "	Weehawken, -	2 "
Patapsco, - -	2 "	Wassuc, - - -	2 "
Passaic, - - -	2 "	Watauga, - -	8 "
Puritan, - - -	4 "	Wateree, - - -	8 "
Pittsburg, - -	12 "	Waxsaw, - - -	2 "
Passaconaway, -	4 "	Winnipec, - -	— "
Quinsigamond, -	4 "	Yazoo, - - -	2 "
Roanoke, - -	6 "	Yuma, - - -	2 "

I shall let you reckon both the number of these ships and of the guns they carried. Since the catalogue was made, a few months since, changes have occurred, and

will continue to take place by losses and additions. How curious is the variety of names! The seceded States, the Indians, the *ladies*, each share in the honors of the navy, so far as this is concerned. Think of the work the quiet propeller which the British Admiralty rejected, is doing for the Republic alone! Has not the miner-boy "paid his way" in the "new world"?

Some reader may inquire, "What does the Government pay the officers of the navy, who live so much of the time on the sea?" The wages given below, from those of the rear-admiral to the "boys," are taken from Mr. McKean's *Annals of the Navy*:

	Per annum.
Rear Admirals (*Active List*).	
When at sea	$5,000
When on shore duty	4,000
On leave or waiting orders	3,000
On *Retired List*	2,000
Commodores (*Active List*).	
When at sea	4,000
When on shore duty	3,200
On leave or waiting orders	2,400
On *Retired List*	1,800
Captains (*Active List*).	
When at sea	3,500
When on shore duty	2,800
On leave or waiting orders	2,100
On *Retired List*	1,600

	Per annum.
COMMANDERS (*Active List*).	
When at sea	$2,800
When on shore duty	2,240
On leave or waiting orders	1,680
On *Retired List*	1,400
LIEUTENANT COMMANDERS (*Active List*).	
When at sea	2,343
When on shore duty	1,875
On leave or waiting orders	1,500
On *Retired List*	1,300
LIEUTENANTS (*Active List*)	
When at sea	1,875
When on shore duty	1,500
On leave or waiting orders	1,200
On *Retired List*	1,000
MASTERS (*Active List*).	
When at sea	1,500
When on shore duty	1,200
On leave or waiting orders	960
On *Retired List*	800
ENSIGNS (*Active List*).	
When at sea	1,200
When on shore duty	960
On leave or waiting orders	768
On *Retired List*	500
MIDSHIPMEN	500
FLEET SURGEONS	3,300
SURGEONS—On duty at sea—	
For first five years after date of commission as surgeon	2,200
For second five years after date of commission as surgeon,	2,400
For third five years after date of commission as surgeon	2,600

	Per annum.
For fourth five years after date of commission as surgeon,	$2,800
For twenty years and upwards after date of commission...	3,000
On other duty—	
For first five years after date of commission as surgeon...	2,000
For second five years after date of commission as surgeon,	2,200
For third five years after date of commission as surgeon..	2,400
For fourth five years after date of commission as surgeon..	2,600
For twenty years and upwards after date of commission...	2,800
On leave or waiting orders—	
For first five years after date of commission as surgeon...	1,600
For second five years after date of commission as surgeon,	1,800
For third five years after date of commission as surgeon..	1,900
For fourth five years after date of commission as surgeon..	2,100
For twenty years and upwards after date of commission..	2,300
RETIRED SURGEONS—	
Surgeons ranking with commanders.....	1,100
Surgeons ranking with lieutenants.....	1,000
RETIRED PASSED AND ASSISTANT SURGEONS—	
Passed.....	850
Assistant.....	650
PASSED ASSISTANT SURGEONS—	
On duty at sea.....	1,500
On other duty.....	1,400
On leave or waiting orders.....	1,100
ASSISTANT SURGEONS—	
On duty at sea.....	1,250
On other duty.....	1,050
On leave or waiting orders.....	800
PAYMASTERS—On duty at sea	
For first five years after date of commission.....	2,000

	Per annum.
For second five years after date of commission	$2,400
For third five years after date of commission	2,600
For fourth five years after date of commission	2,900
For twenty years and upwards after date of commission	3,100
On other duty—	
For first five years after date of commission	1,800
For second five years after date of commission	2,100
For third five years after date of commission	2,400
For fourth five years after date of commission	2,600
For twenty years and upwards after date of commission	2,800
On leave or waiting orders—	
For first five years after date of commission	1,400
For second five years after date of commission	1,600
For third five years after date of commission	1,800
For fourth five years after date of commission	2,000
For twenty years and upwards after date of commission	2,250
PAYMASTERS RETIRED [Under acts of Aug. 3 and Dec. 21, 1861]—	
Ranking with captains	1,300
Ranking with commanders	1,100
Ranking with lieutenants	1,000
ASSISTANT PAYMASTERS—On duty at sea—	
First five years after date of commission	1,300
After five years from date of commission	1,500
On other duty—	
For first five years after date of commission	1,000
After five years from date of commission	1,200
On leave or waiting orders—	
First five years after date of commission	800
After five years from date of commission	1,000
CHAPLAINS—To be paid as lieutenants.	

	Per annum.
PROFESSORS OF MATHEMATICS—	
On duty	$1,800
On leave or waiting orders	960
BOATSWAIN, GUNNERS, CARPENTERS, AND SAILMAKERS—	
On duty at sea—	
For first three years' sea-service from date of appointment,*	1,000
For second three years' sea-service from date of appointment	1,150
For third three years' sea-service from date of appointment,	1,250
For fourth three years' sea-service from date of appointment,	1,350
For twelve years' sea-service and upwards	1,450
On other duty—	
For first three years' sea-service after date of appointment,	800
For second three years' sea-service after date of appointment	900
For third three years' sea-service after date of appointment,	1,000
For fourth three years' sea-service after date of appointment,	1,100
For twelve years' sea-service and upwards	1,200
On leave or waiting orders—	
For first three years' sea-service after date of appointment,	600
For second three years' sea-service after date of appointment	700
For third three years' sea-service after date of appointment,	800
For fourth three years' sea-service after date of appointment,	900
For twelve years' sea-service and upwards	1,000
CHIEF ENGINEERS—On duty—	
For first five years after date of commission	1,800
For second five years after date of commission	2,200
For third five years after date of commission	2,450
After fifteen years from date of commission	2,600

* Act of July 15, 1863.

	Per annum.
On leave or waiting orders—	
For first five years after date of commission	$1,200
For second five years after date of commission	1,300
For third five years after date of commission	1,400
After fifteen years from date of commission	1,500
First Assistant Engineers—	
On duty	1,250
On leave or waiting orders	900
Second Assistant Engineers—	
On duty	1,000
On leave or waiting orders	750
Third Assistant Engineers—	
On duty	750
On leave or waiting orders	600
Navy Agents, commissions not to exceed	3,000
Navy Agent at San Francisco	4,000
Temporary Navy Agents	
Naval Storekeepers	
Officers of the navy on foreign stations	1,500
Engineer-in-Chief	3,000
Naval Constructors	2,600
Naval Constructors, when not on duty	1,800
Secretaries to commanders of squadrons	1,500
Clerks to commanders of squadrons and commanders of vessels,	500
At navy-yards Boston and New York	1,200
At navy-yard Washington	1,200
At navy-yards Portsmouth, N. H., and Philadelphia	1,200
At navy-yard Mare Island	1,500
First Clerks to commandants—	
At Boston and New York	1,200
At Washington	1,200

	Per annum.
At Portsmouth and Philadelphia	$1,200
At Mare Island	1,500
SECOND CLERKS to commandants—	
At Boston, New York, and Washington	960
CLERKS—	
To paymasters in ships-of-the-line	700
To paymasters in frigates	500
To paymasters in smaller vessels than a frigate	400
To paymasters at navy-yards	500
YEOMEN—	Per month.
In ships-of-the-line	$45 00
In frigates	40 00
In sloops	30 00
In smaller vessels	24 00
ARMORERS—	
In ships-of-the-line	30 00
In frigates	25 00
In sloops	20 00
MATES—	
Master's (acting)	40 00
Boatswain's	25 00
Gunner's	25 00
Carpenter's	25 00
Sailmaker's	20 00
Armorer's	20 00
MASTER-AT-ARMS	25 00
SHIP'S CORPORALS	20 00
COXSWAINS	24 00
QUARTERMASTERS	24 00
QUARTER-GUNNERS	20 00

	Per month.
CAPTAINS—	
Of forecastle	$24 00
Of tops; afterguard, and hold, each	20 00
COOPERS	20 00
PAINTERS	20 00
STEWARDS—	
Ship's	30 00
Officers'	20 00
Surgeons, where ship's complement is 400 and over	40 00
Surgeons where ship's complement is 200 and under 400,	33 00
Surgeons, where ship's complement is under 200	25 00
Paymasters, where complement is 240 and over	33 00
Assistant paymasters, where complement is 100 and over,	33 00
Assistant paymasters, where complement is under 100	30 00
NURSES—	
Where complement is less than 200, one nurse	14 00
Where complement is over 200, two nurses, each	14 00
COOKS—	
Ship's	24 00
Officer's	20 00
MASTERS OF THE BAND	20 00
MUSICIANS—	
First class	15 00
Second class	12 00
SEAMEN	18 00
ORDINARY SEAMEN	14 00
LANDSMEN	12 00
BOYS	8 00 and 9 00
FIREMEN—	
First class	30 00
Second class	25 00
COAL-HEAVERS	18 00

You will be interested in a new form of a propeller vessel, in the first voyage of which a brave boy is no mean actor. The story is told by one of the few permitted to see and know all about it:

"On November 25, 1864, the *Stromboli* made an experimental trial trip to thoroughly test all of her machinery, and on Saturday she took her departure from these waters for the purpose of making her *debut* upon the stage of active operations, and, we may be permitted to say, to fully demonstrate the power, efficiency, and destructiveness of the new system of naval warfare. Before we proceed to describe the trial trip, let us first give a brief outline of the history of the vessel, and even go back to the inception of the idea.

"Several years ago, William W. W. Wood, the present Senior Chief Engineer to the United States Navy, conceived the idea of using the sub-marine torpedo in a manner not formerly experimented upon or known. As time passed, the simplicity and perfect working of his plans became so patent that he felt satisfied in his mind that it would perform the work required beyond a doubt. Less than two years ago, the subject was casually brought to the notice of Admiral Gregory, who immediately urged upon the Navy Department the appointment of a Board of Examiners to inquire into the merits of the invention, and report upon the same. This Board, composed of some of the most practical officers in the service, gave the

subject a very careful examination, and unanimously reported in its favor, recommending the construction of a vessel to fully demonstrate the idea. The Navy Department, alive to the great importance of the system, immediately ordered the construction of what is now the *Stromboli.*

"First Assistant Engineer John L. Lacy, a young officer who had also been investigating the subject of torpedo warfare, was selected to superintend the construction of the vessel and her machinery. As it was necessary to keep the matter quiet and beyond the inquisitive eyes of traitors and foreign emissaries, the hull was built at Fair Haven, Connecticut, the engines at Mystic, Conn., and the torpedo machinery at Schenectady, N. Y. Mr. Samuel H. Pook, a young and skilful naval architect, was selected to build the hull, the Reliance Machine Company the propelling engines, and Cute Brothers the torpedo machinery, and Benjamin and Root the torpedo engine, and in this way the work was distributed so that it was not easy for the inquisitive to put all the parts together and be much the wiser. After she was launched she was towed to Mystic, and there received her boiler and engines; from thence she came over to Messrs. Secor's yard at Jersey City, where she received her deck plating, pilot-house, and her final completion. Such is the brief history of the inception and production of the first torpedo boat of the United States Navy, designed, built, and sailed by native-born citizens.

"THE FIRST EXPERIMENTAL TRIAL TRIP.—On Friday, the 25th instant, the little *Stromboli* made her experimental trial trip to test her propulsive and torpedo engines. She left the wharf at the Secor yard about 11 o'clock, A. M., and under the pilotage of Captain John McGinn, proceeded up the Hudson River some distance, making an average speed of nine knots per hour, and steering beautifully from on top of the pilot-house as well as from below decks. After some tests of the propulsive machinery, it was decided to fire a 'Wood torpedo,' of the same pattern as was furnished to, and used with such success by Lieutenant Cushing in the destruction of the rebel ram *Albemarle*.

"TEST OF THE FIFTY-POUNDER TORPEDO.—This torpedo was charged with only forty-eight pounds of powder, and was placed in the basket, run out, detached, and when at a given point, about one foot below the surface of the water, it was exploded, less than two a half minutes being consumed in the whole operation. The explosion and the peculiar appearance of the column of water thrown up by the torpedo can be but illy described with a pen; instantaneous photography might have done it, but no painter could have depicted the scene with justice. The water was thrown up about one hundred and eighty feet in a perpendicular column, which measured about ten feet in diameter.

"Branching off from the main column were thick

jets of heavy spray, or rather broad sheets of showy white water, which the breeze bore back upon the deck of the vessel. Around this huge column of water, and mingling with the jets, the whitish fantastic clouds of powder smoke circled, making a beautiful picture, ever changing and passing away in a brief space of time. The torpedo when exploded was only fifteen feet distant from the bow of the vessel, and the shock as felt on board was very slight indeed. Every one was charmed with the experiment.

"TRIAL OF THE SIXTY-POUNDER TORPEDO.—It was now decided to try a torpedo placed twenty feet below the surface of the water, and about the same distance from the bow of the vessel; this torpedo contained sixty pounds of powder, and was placed in position as in the former experiment, but was exploded by Beardsley's magnetic electro-machines, a beautiful specimen of art. The explosion at this time produced different results and still more interesting. The water was thirty feet deep, and the torpedo at the instant of explosion was ten feet from the bed of the river, consequently it was a trifle longer before the tremendous result made itself manifest. When it did come it was awfully grand, a black cone surmounting a blacker column arose from the surface and quickly mounted aloft, at least three score feet, being twenty feet in diameter and thick with mud. The muddy jets did not leave the column quite as soon as in the former experiment, but the white smoke curling around the dark centre

column made a picture novel, and at the same time one which a reflecting mind could not fail to be awed with.

"It presented an unmistakable evidence of the power which the machine possessed for harm, and which at times lying dormant could be roused in an incalculable space of time, and let loose for destruction of life and property. The shock of this torpedo was felt over a space about one hundred and fifty yards in diameter; it lifted, or felt as if it did, the bow of the vessel about nine inches, but produced no unpleasant sensation. Space prevents us from going into the details of the sensation experienced while witnessing these experiments. We are satisfied that this vessel, for destructive purposes, has no equal in the world. No iron-clad can withstand its power. It is perfectly safe to operate in, and the nearer she approaches an enemy the safer she becomes, while every foot nearer she approaches her victim, only hastens the time of her certain destruction. The experiments being over the *Stromboli* and her consort, Picket Boat No. 6, steamed back to their stations.

"DEPARTURE OF THE 'STROMBOLI.'—Saturday, 26th November, was the time announced for her departure, and by two o'clock every thing was in readiness save a few trifling details. The crew was selected from on board of the *Vermont*, and so great was the desire to go in her manifested, that 'all hands and the cook' volunteered, and earnestly entreated to be allowed to serve in

the torpedo boat. Seven men were selected, and with bag and hammock were soon on board of picket boat No. 6, in charge of Engineer Griffin, and *en route* for Jersey City. On arriving the crew were transferred to the *Stromboli*, and a prouder list of fellows could not be found for miles around. More than one volunteer presented himself at the dock, being anxious to go in her. One young lad, named Edwin Booth, pressed so hard that he was permitted to go. The joy and happiness depicted on the face of this lad when he received permission was of a character seldom seen. We shall hear of that boy one of these days.

"As the public (designedly) had not been notified of the time or place of departure, only a few persons were present. Among those on board we noticed Captain Boggs, Chief Engineer Wood, W. H. Webb, Engineer Hall, Donald McKay and Mr. Winters, of Boston; all the Messrs. Secor, Captain Woolsey, Mr. Birkbeck, Mr. Dunham, and perhaps half a dozen others.

"At half-past three o'clock the vessel was put in commission by the commanding officer, with the following list of officers and crew:—First Assistant Engineer, John L. Lay, commanding; Second Assistant Engineers, Charles H. Stone, J. B. Chadwick, John Smith; Third Assistant Engineer, Byron S. Heath; Quartermaster, Benjamin Baker; Seaman, John Bristol; First-class Firemen, William Bane, W. Lowry; Second-class Fireman, William

Muller; Coal heavers, D. Coleman, D. Johnson; Landsmen, J. Thomas (colored), Edwin Booth, volunteer.

"About this time picket boat No. 6 took her departure for the canal. She would await the arrival of the *Stromboli* at New Brunswick. At about four o'clock the *Stromboli*, convoyed by the tug *John T. Jenkins*, took their departure, amid the cheers of the little crowd of spectators. They entered the canal about dark, and arrived at New Brunswick on Sunday, *en route* for Hampton Roads."

Here is the story of a "new Cassabianca"—a boy too young to know much about the real cause of the fearful war. The scene occurred on board the "Harriet Lane," at Galveston, Texas:

"Almost the first men struck down were the gallant Captain Wainwright and Lieutenant Lee, who both fought, says an eye-witness, with a desperation and valor that no mortal could surpass. He saw them bleeding and prostrate upon the deck, still dealing death among their enemies. One young son of Captain Wainwright—only ten years old, just think of it!—stood at the cabin door, a revolver in each hand, and never ceased firing until he had expended every shot. One of his poor little hands was disabled by a ball, shattering his four fingers, and then his infantile soul gave way; he burst into tears, and cried: 'Do you want to kill me?' Darling young hero—may his country never forget him! Where is the

Hemans to wed his name to immortal verse, like another Cassabianca? Philanthropists, whose hearts are yearning for something to love, here is a noble orphan boy on whom to lavish your care."

CHAPTER XXI.

Our Knowledge of the Sea—Curious Traditions—The "World of Waters"—Robert Fulton and John Ericsson—The Future—Great Battles—The Mother's Lament.

CAPTAIN ERICSSON'S life is so associated with the ocean, and likely to be identified with all progress there, that a glance at the shadowy past will give interest to the present and future history of the "wide, wide sea." And as you read you will ask yourself, what would those credulous ancients have thought to see the "Flying Devil," a Caloric Engine, or even a locomotive in motion. Forcibly writes one who has wielded his pen for the entertainment of boys:*

"In early times, in the scriptural and classic periods, the great oceans were unknown. Mankind—at least that portion whose history has descended to us—dwelt upon the borders of an inland, mediterranean sea. They had

* F. B. Goodrich.

never heard of such an expanse of water as the Atlantic, and certainly had never seen it. The land-locked sheet which lay spread out at their feet was at all times full of mystery, and often even of dread and secret misgiving. Those who ventured forth upon its bosom came home and told marvellous tales of the sights they had seen and the perils they had endured. Homer's heroes returned to Ithaca with the music of the sirens in their ears and the cruelties of the giants upon their lips. The Argonauts saw whirling rocks implanted in the sea, to warn and repel the approaching navigator; and, as if the mystery of the waters had tinged with fable even the dry land beyond it, they filled the Caucasus with wild stories of enchantresses, of bulls that breathed fire, and of a race of men that sprang, like a ripened harvest, from the prolific soil. If the ancients were ignorant of the shape of the earth, it was for the very reason that they were ignorant of the ocean. Their geographers and philosophers, whose observations were confined to fragments of Europe, Asia, and Africa, alternately made the world a cylinder, a flat surface begirt by water, a drum, a boat, a disk. The legends that sprang from these confused and contradictory notions made the land a scene of marvels and the water an abode of terrors.

"At a later period, when, with the progress of time, the love of adventure or the needs of commerce had drawn the navigator from the Mediterranean through the Pillars

of Hercules into the Atlantic, and when some conception of the immensity of the waters had forced itself upon minds dwarfed by the contracted limits of the inland sea, then the ocean became in good earnest a receptacle of gloomy and appalling horrors, and the marvels narrated by those fortunate enough to return told how deeply the imagination had been stirred by the new scenes opened to their vision. Pytheas, who coasted from Marseilles to the Shetland Isles, and who there obtained a glance at the bleak and wintry desolation of the North Sea, declared, on reaching home, that his further progress was barred by an immense black mollusk, which hung suspended in the air, and in which a ship would be inextricably involved, and where no man could breathe. The menaces of the South were even more appalling than the perils of the North; for he who should venture, it was said, across the equator into the regions of the Sun, would be changed into a negro for his rashness: besides, in the popular belief, the waters there were not navigable. Upon the quaint charts of the Middle Ages, a giant located upon the Canary Islands forbade all further venture westward, by brandishing his formidable club in the path of all vessels coming from the east. Upon these singular maps the concealed and treacherous horrors of the deep were displayed in the grotesque shapes of sea-monsters and distorted water unicorns, which were represented as careering through space and waylaying the navigator. Even

in the time of Columbus, and when the introduction of the compass into European ships should have somewhat diminished the fantastic terrors of the sea, we find that the Arabians, the best geographers of the time, represented the bony and gnarled hand of Satan as rising from the waves of the Sea of Darkness—as the Atlantic was then called—ready to seize and engulf the presumptuous mariner. The sailors of Columbus, on reaching the Sargasso Sea, where the collected weeds offered an impediment to their progress, thought they had arrived at the limit of navigation and the end of the world. Five years later the crew of da Gama, on doubling the Cape of Good Hope, imagined they saw, in the threatening clouds that gathered about Table Rock, the form of a spectre waving off their vessel and crying woe to all who should thus invade his dread dominion.

"And now Columbus had discovered the Western Continent, da Gama had found an ocean route to the Indies, and Magellan, sailing around the world, had proved its sphericity, and approached the Spice Islands from the east. For centuries, now, the two great oceans were the scenes of grand and useful maritime expeditions. The tropical islands of the Pacific arose, one by one, from the bosom of the sea, to reward the navigator or relieve the outcast. The Spanish, by dint of cruelty and rapacity, filled their famous Manilla galleons and Acapulco treasure-ships with the spoils of warfare and the legitimate fruits

of trade. The English, seeking to annoy a nation with whom, though not at war, they were certainly not at peace, sent against their golden fleets the piratical squadrons of Anson, Drake, and Hawkins. For years property was not safe upon the sea, and trading-ships went armed, while the armed vessels of nations turned buccaneers. The Portuguese and Dutch colonized the coasts and islands of India, Spain sent Cortez and Pizarro to Mexico and Peru, and England drove the Puritans across a stormy sea to Plymouth. Commerce was spread over the world, and Civilization and Christianity were introduced into the desert and the wilderness.

"If the distances be considered, the sea is the safest and most commodious route from spot to spot, whether for merchandise or man. It has given up its secrets, with perhaps the single exception of its depth, and, like the lightning and the thunderbolt, has submitted to the yoke. Though still sublime in its immensity and its power, it has lost those features of character which once made it mysterious and fantastic, and has become the sober and humdrum pathway of traffic. Mail-routes are as distinctly marked upon its surface as the equator, or the meridian of Greenwich: steamships leave their docks punctually at the stroke of noon. The monsters that plough its waters have been hunted by man till the race is well-nigh exhausted; for the leviathan which frightened the ancients is the whale which has illuminated the mod-

erns. The chant of the sirens is hushed, and in its place are heard the clatter of rushing paddle-wheels, the fog-whistle on the banks, the song of the forecastle, the yo-ho of sailors toiling at the ropes, the salute in mid-ocean—sometimes, alas! the minute-gun at sea. The romance and fable that once had here their chosen home, have fled to the caves and taken refuge amid the grottos; and the legends that were lately told of the ocean would now be out of place even in a graveyard or a haunted house.

"The sailor, to whom once the route was trackless and untrodden, now consults a volume of charts which he has obtained from the National Observatory, and finds his course laid out upon data derived from analogy and oft-repeated experience. He takes this or that direction in accordance with known facts of the prevalence of winds or the motion of currents. He keeps a record of his own experience, that in its turn it may be useful to others. He has plans and surveys which give him the bearings of every port, the indentations of every coast, the soundings of every pass. Beacons warn him of reefs and sunken rocks, and buoys mark out his course through the shallows of sounds and straits. A modern light-house costs a million dollars, and a breakwater involves the finances of a state. If a new light-house is erected, or is the warning lamp for any reason discontinued, upon any coast, the fact is made known to the commerce of all nations by a 'Notice to Mariners,' inserted in the marine department of the

newspapers most likely to meet their eye. A vessel at sea is safer from spoliation than is the traveller upon the high road or the sojourner in a city; for there are robbers and depredators everywhere upon the land, while there is not a pirate on the ocean. There are well-laden treasure ships in the Panama and California waters, as in the times of Drake and Anson; but the world is much older than it was, and buccaneers and filibusters now only infest the land.

"In short, the ocean, once a formidable and repellant element, now furnishes Christian food and healthful employment to millions. Instead of serving to affright and appall the dwellers upon the continents which it surrounds, it renders their atmosphere more respirable, it affords them safe conveyance, and raises for them a school of heroes."

We add a fine passage from Dr. Greenwood's "Poetry and Mystery of the Sea," on Old Ocean:

"'The sea is his, and He made it,' cries the Psalmist of Israel, in one of those bursts of enthusiasm in which he so often expresses the whole of a vast subject by a few simple words. Whose else, indeed, could it be, and by whom else could it have been made? Who else can heave its tides and appoint its bounds? Who else can urge its mighty waves to madness with the breath and wings of the tempest, and then speak to it again in a master's accents and bid it be still? Who else could have

peopled it with its countless inhabitants, and caused it to bring forth its various productions, and filled it from its deepest bed to its expanded surface, filled it from its centre to its remotest shores, filled it to the brim with beauty and mystery and power? Majestic Ocean! Glorious Sea! No created being rules thee or made thee.

"What is there more sublime than the trackless, desert, all-surrounding, unfathomable sea? What is there more peacefully sublime than the calm, gently-heaving, silent sea? What is there more terribly sublime than the angry, dashing, foaming sea? Power—resistless, overwhelming power—is its attribute and its expression, whether in the careless, conscious grandeur of its deep rest, or the wild tumult of its excited wrath. It is awful when its crested waves rise up to make a compact with the black clouds and the howling winds, and the thunder and the thunderbolt, and they sweep on, in the joy of their dread alliance, to do the Almighty's bidding. And it is awful, too, when it stretches its broad level out to meet in quiet union the bended sky, and show in the line of meeting the vast rotundity of the world. There is majesty in its wide expanse, separating and enclosing the great continents of the earth, occupying two-thirds of the whole surface of the globe, penetrating the land with its bays and secondary seas, and receiving the constantly-pouring tribute of every river, of every shore. There is majesty in its fulness, never diminishing and never increasing.

Its depth is sublime: who can sound it? Its strength is sublime: what fabric of man can resist it? Its voice is sublime, whether in the prolonged song of its ripple or the stern music of its roar—whether it utters its hollow and melancholy tones within a labyrinth of wave-worn caves, or thunders at the base of some huge promontory, or beats against a toiling vessel's sides, lulling the voyager to rest with the strains of its wild monotony, or dies away, with the calm and fading twilight, in gentle murmurs on some sheltered shore.

"The sea possesses beauty, in richness, of its own; it borrows it from earth, and air, and heaven. The clouds lend it the various dyes of their wardrobe, and throw down upon it the broad masses of their shadows as they go sailing and sweeping by. The rainbow laves in it its many-colored feet. The sun loves to visit it, and the moon and the glittering brotherhood of planets and stars, for they delight themselves in its beauty. The sunbeams return from it in showers of diamonds and glances of fire; the moonbeams find in it a pathway of silver, where they dance to and fro, with the breezes and the waves, through the livelong night. It has a light, too, of its own—a soft and sparkling light, rivalling the stars; and often does the ship which cuts its surface leave streaming behind a Milky Way of dim and uncertain lustre, like that which is shining dimly above. It harmonizes in its forms and sounds both with the night and the day. It cheerfully reflects

the light, and it unites solemnly with the darkness. It imparts sweetness to the music of men, and grandeur to the thunder of heaven. What landscape is so beautiful as one upon the borders of the sea? The spirit of its loveliness is from the waters where it dwells and rests, singing its spells and scattering its charms on all the coasts. What rocks and cliffs are so glorious as those which are washed by the chafing sea? What groves and fields and dwellings are so enchanting as those which stand by the reflecting sea?

"If we could see the great ocean as it can be seen by no mortal eye, beholding at one view what we are now obliged to visit in detail and spot by spot—if we could, from a flight far higher than the eagle's, view the immense surface of the deep all spread out beneath us like a universal chart—what an infinite variety such a scene would display! Here a storm would be raging, the thunder bursting, the waters boiling, and rain and foam and fire all mingling together; and here, next to this scene of magnificent confusion, we should see the bright blue waves glittering in the sun and clapping their hands for very gladness. Here we should see a cluster of green islands set like jewels in the bosom of the sea; and there we should see broad shoals and gray rocks, fretting the billows and threatening the mariner. Here we should discern a ship propelled by the steady wind of the tropics, and inhaling the almost visible odors which diffuse them-

selves around the Spice Islands of the East; there we should behold a vessel piercing the cold barrier of the North, struggling among hills and fields of ice, and contending with winter in his own everlasting dominion. Nor are the ships of man the only travellers we shall perceive upon this mighty map of the ocean. Flocks of sea-birds are passing and repassing, diving for their food or for pastime, migrating from shore to shore with unwearied wing and undeviating instinct, or wheeling and swarming around the rocks which they make alive and vocal by their numbers and their clanging cries.

"We shall behold new wonders and riches when we investigate the sea-shore. We shall find both beauty for the eye and food for the body, in the varieties of shell-fish which adhere in myriads to the rocks or form their close dark burrows in the sands. In some parts of the world we shall see those houses of stone which the little coral-insect rears up with patient industry from the bottom of the waters, till they grow into formidable rocks and broad forests whose branches never wave and whose leaves never fall. In other parts we shall see those pale, glistening pearls which adorn the crowns of princes and are woven in the hair of beauty, extorted by the relentless grasp of man from the hidden stores of ocean. And spread round every coast there are beds of flowers and thickets of plants, which the dew does not nourish, and which man has not sown, nor cultivated, nor reaped, but

which seem to belong to the floods alone and the denizens of the floods, until they are thrown up by the surges, and we discover that even the dead spoils of the fields of ocean may fertilize and enrich the fields of earth. They have a life, and a nourishment, and an economy of their own; and we know little of them, except that they are there, in their briny nurseries, reared up into luxuriance by what would kill, like a mortal poison, the vegetation of the land.

"There is mystery in the sea. There is mystery in its depths. It is unfathomed, and, perhaps, unfathomable. Who can tell, who shall know, how near its pits run down to the central core of the world? Who can tell what wells, what fountains, are there, to which the fountains of the earth are but drops? Who shall say whence the ocean derives those inexhaustible supplies of salt which so impregnate its waters that all the rivers of the earth, pouring into it from the time of the creation, have not been able to freshen them? What undescribed monsters, what unimaginable shapes, may be roving in the profoundest places of the sea, never seeking—and perhaps, from their nature, never able to seek—the upper waters and expose themselves to the gaze of man! What glittering riches, what heaps of gold, what stores of gems, there must be scattered in lavish profusion in the ocean's lowest bed! What spoils from all climates, what works of art from all lands, have been engulfed by the insatiable

and reckless waves! Who shall go down to examine and reclaim this uncounted and idle wealth? Who bears the keys of the deep?

"And oh! yet more affecting to the heart and mysterious to the mind, what companies of human beings are locked up in that wide, weltering, unsearchable grave of the sea! Where are the bodies of those lost ones over whom the melancholy waves alone have been chanting requiem? What shrouds were wrapped round the limbs of beauty, and of manhood, and of placid infancy, when they were laid on the dark floor of that secret tomb? Where are the bones, the relics, of the brave and the timid, the good and the bad, the parent, the child, the wife, the husband, the brother, the sister, the lover, which have been tossed and scattered and buried by the washing, wasting, wandering sea? The journeying winds may sigh as year after year they pass over their beds. The solitary rain-cloud may weep in darkness over the mingled remains which lie strewed in that unwonted cemetery. But who shall tell the bereaved to what spot their affections may cling? And where shall human tears be shed throughout that solemn sepulchre? It is mystery all. When shall it be resolved? Who shall find it out? Who but He to whom the wildest waves listen reverently, and to whom all nature bows; He who shall one day speak, and be heard in ocean's profoundest caves; to whom the deep even the lowest deep, shall give up its dead, when the sun

shall sicken, and the earth and the isles shall languish, and the heavens be rolled together like a scroll, and there shall be NO MORE SEA."

"Who invented and first used ships?" you ask.

This question will never be answered. Men found means of crossing rivers and inland seas before the historian recorded the attempts at navigation. Indeed, it is probable that the earliest annals of life upon the seas, were lost in the revolutions and fall of empires. "Imagination has suggested that the nautilus, or Portuguese man-of-war, raising its tiny sail and floating off before the breeze, first pointed out to man the use which might be made of the wind as a propelling force; that a split reed, following the current of some tranquil stream and transporting a beetle over its glassy surface, was the first canoe, while the beetle was the first sailor. Mythology represents Hercules as sailing in a boat formed of the hide of a lion, — and translates ships to the skies, where they still figure among the constellations. Fable makes Atlas claim the invention of the oar, and gives to Tiphys, the pilot of the Argo, the invention of the rudder. The attributing of these discoveries and improvements to particular individuals doubtless afforded pastime to poets in ages when poetry was more popular than history. Instead of trusting to these fanciful authorities, we may form a very rational theory upon the matter in the following manner:

"Whether it was an insect that floated on a leaf across

a rivulet and was stranded on the bank, or a beaver carried down a river upon a log, or a bear borne away upon an iceberg, that first awakened man to the conception of trusting himself fearlessly upon the water, it is highly probable that he learned from animals, whose natural element it is, the manner of supporting his body upon it and of forcing his way through it. A frog darting away from the rim of a pond and striking out with his fore-legs may have suggested swimming, and the beaver floating on a log may have suggested following his example. The log may not have been sufficiently buoyant, and the adventurer may have added to its buoyancy by using his arms and legs. Even to this day the Indians of our own country cross a rapid stream by clasping the trunk of a tree with the left leg and arm and propelling themselves with the right. Thus the first step was taken; and the second was either to place several logs together, thus forming a raft, and raising its sides, or to make use of a tree hollowed out by nature. Many trees grow hollow naturally, such as oaks, limes, beeches, and willows; and it would not require a degree of adaptation beyond the capacity of a savage, to fit them to float and move upon the water. The next step was probably to hollow out by art a sound log, thus imitating the trunk which had been eroded by time and decay. And, in making this step from the sound to the hollow log, the primitive mariners may have been assisted by observing how an empty nut-

shell or an inverted tortoise-shell floated upon the water, preserving their inner surface dry and protecting such objects as their size enabled them to carry. It has been aptly remarked that this first step was the greatest of all—'for the transition from the hollow tree to the ship-of-the-line is not so difficult as the transition from nonentity to the hollow tree.'

"The first object for obtaining motion upon the water must evidently have been to enable the navigator to cross a river—not to ascend or descend it; as it is apparent he would not seek the means of following or stemming its current while the same purpose could be more easily served by walking along the shore. It is not difficult to suppose that the oar was suggested by the legs of a frog or the fins of a fish. The early navigator, seated in his hollow tree, might at first seek to propel himself with his hands, and might then artificially lengthen them by a piece of wood fashioned in imitation of the hand and arm—a long pole terminating in a thin flat blade. Here was the origin of the modern row-boat, one of the most gracefull inventions of man.

"From the oar to the rudder the transition was easy, for the oar is in itself a rudder, and was for a long time used as one. It must have been observed at an early day that a canoe in motion was diverted from its direct course by plunging an oar into the water and suffering it to remain there. It must have been observed, too, that an oar in or

toward the stern was more effective in giving a new direction to the canoe than an oar in any other place. It was a natural suggestion of prudence, then, to assign this duty to one particular oarsman, and to place him altogether at the stern.

"The sail is not so easily accounted for. An ancient tradition relates that a fisherman and his sweetheart, allured from the shore in the hope of discovering an island, and surprised by a tempest, were in imminent danger of destruction. Their only oar was wrenched from the grasp of the fisherman, and the frail bark was thus left to the mercy of the waves. The maiden raised her white veil to protect herself and her lover from the storm; the wind, inflating this fragile garment, impelled them slowly but surely toward the coast. Their aged sire, the tradition continues, suddenly seized with prophetic inspiration, exclaimed, 'The future is unfolded to my view! Art is advancing to perfection! My children, you have discovered a powerful agent in navigation. All nations will cover the ocean with their fleets and wander to distant regions. Men, differing in their manners and separated by seas, will disembark upon peaceful shores, and import thence foreign science, superfluities, and art. Then shall the mariner fearlessly cruise over the immense abyss and discover new lands and unknown seas!' Though we may admire the foresight of this patriarch, we cannot applaud him for choosing a moment so inopportune for ex-

ercising his peculiar gift: it would certainly have been more natural to afford some comfort to his weather-beaten children. The legend even goes on to state that he at once fixed a pole in the middle of the canoe, and attaching to it a piece of cloth, invented the first sail-boat. Mythology assigns a different, though similar, origin to the invention—Iris, seeking her son in a bark which she impelled by oars, perceived that the wind inflated her garments and gently forced her in the direction in which she was going."

The experience of the Ericsson family when steam was introduced into navigation, was mentioned. But you may way wish to know more of the man next to whom stands the great American Swede in the annals of steam to the present time, and in the progress of naval science. Robert Fulton was born nearly forty years before John Ericsson, in Lancaster County, Pennsylvania. Like the miner-boy, he showed in childhood a taste and genius for mechanics. But he chose the artist's more beautiful work, and became a portrait painter. He travelled in England and France, and while in the empire of the great Napoleon, he conceived a vessel which would sail by steam instead of canvas and the wind. It is a curious fact that he should offer his invention to the Emperor to meet with indifference, and Ericsson, more than fifty years later, sent a model of his *Monitor*, with a like result, to Napoleon III.! Fulton returned to the young

Republic in December, 1806. "His mind was now occupied with two projects—the invention of submarine explosives and the construction of a steamboat. He published a work entitled 'Torpedo War,' with the motto, 'The liberty of the seas will be the happiness of the earth.' He renewed his acquaintance with Chancellor Livingston, whom he had known when ambassador to Paris. This gentleman had long had entire faith in the practicability of steam-navigation, and as early as 1798 had obtained from the Legislature of New York a monopoly of all such navigation upon the waters of the State, provided he would within twelve months build a boat which should go four miles an hour by steam. When they met in America, in 1806, the two entered into a partnership and commenced the construction of a boat. Finding the expenses unexpectedly heavy, they offered to sell one-third of their patent; but no one would invest in an enterprise universally deemed hopeless. The boat was nevertheless launched, in the spring of 1807, from the shipyard of Charles Brown, on the East River. She was supplied with an engine built in England, and was driven by steam, in August, from the New York side to the Jersey shore. The incredulous crowd who had assembled to laugh stayed to wonder and applaud.

"The *Clermont* soon after sailed for Albany, her departure having been announced in the newspapers as a grand and unequalled curiosity. 'She excited,' says

Colden, in his Life of Fulton, 'the astonishment of the inhabitants of the shores of the Hudson, many of whom had not heard even of an engine, much less of a steamboat. There were many descriptions of the effects of her first appearance upon the people of the bank of the river: some of these were ridiculous, but some of them were of such a character as nothing but an object of real grandeur could have excited. She was described, by some who had indistinctly seen her passing in the night, as a monster moving on the waters, defying the winds and tide, and breathing flames and smoke. She had the most terrific appearance from other vessels which were navigating the river when she was making her passage. The first steamboat—as others yet do—used dry pine wood for fuel, which sends forth a column of ignited vapor many feet above the flue, and whenever the fire is stirred a galaxy of sparks fly off, and in the night have a very brilliant and beautiful appearance. This uncommon light first attracted the attention of the crews of other vessels. Notwithstanding the wind and tide, which were adverse to its approach, they saw with astonishment that it was rapidly coming toward them; and when it came so near that the noise of the machinery and paddles was heard, the crews —if what was said in the newspapers of the time be true— in some instances shrunk beneath their decks from the terrific sight and left their vessels to go on shore, whilst others prostrated themselves and besought Providence to protect

them from the approaches of the horrible monster which was marching on the tide and lighting its path by the fires which it vomited.' "

You will follow with interest the history of this first steamer—a craft which, beside the *Princeton* or *Dictator*, would look like the work of the ancients, or of the half-civilized Chinamen. The happy inventor thus writes of his excursion up the glorious Hudson: "I left New York on Monday at one o'clock, and arrived at Clermont, the seat of Chancellor Livingston, at one o'clock on Tuesday: time, twenty-four hours; distance, one hundred and ten miles. On Wednesday, I departed from the chancellor's at nine in the morning, and arrived at Albany at five in the afternoon: time, eight hours; distance, forty miles. The sum is one hundred and fifty miles in thirty-two hours—equal to near five miles an hour.

"On Thursday, at nine o'clock in the morning, I left Albany, and arrived at the chancellor's at six in the evening: I started from thence at seven, and arrived at New York at four in the afternoon: time, thirty hours; space run through, one hundred and fifty miles—equal to five miles an hour. Throughout my whole way, both going and returning, the wind was ahead: no advantage could be derived from my sail: the whole has therefore been performed by the power of the steam engine.

"In a letter to one of his friends, Fulton wrote: 'I overtook many sloops and schooners beating to windward,

and parted with them as if they had been at anchor. The power of propelling boats by steam is now fully proved. The morning I left New York there were not perhaps thirty persons who believed that the boat would even move one mile an hour, or be of the least utility; and while we were putting off from the wharf, which was crowded with spectators, I heard a number of sarcastic remarks. This is the way in which ignorant men compliment what they call philosophers and projectors. . . . Although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting on the immense advantage that my country will derive from the invention.'

"The *Clermont* was now advertised as a regular passenger-boat upon the Hudson. She met with numerous accidents during the season; and her obvious defects would have been remedied by the application of as obvious improvements by Fulton himself, had not other persons anticipated him by taking out patents for improvements which they themselves proposed. They thus caused him infinite annoyance, and even contested his right as an inventor. Shipmasters, too, who looked upon his boat as an intruder upon their domain, ran their vessels purposely foul of her on more than one occasion. The Legislature saw fit to counteract the effects of this hostility by passing an act prolonging Livingston and Fulton's privilege five years for every additional boat established—the whole

time, however, not to exceed thirty years. It also made all combinations to destroy the *Clermont* offences punishable by fine and imprisonment.

"Thus protected, the *Clermont* ran throughout the season, always well laden with passengers. In the winter she was enlarged and improved. The wheel-guards were strengthened, and became a prominent and essential feature of the boat. The rudder was replaced by one of much larger dimensions, and a steering-wheel toward the bow was substituted for the ordinary tiller. The accommodations for passengers were made much more comfortable—luxurious even—and the public taste was consulted in the application of numerous coats of rather gaudy paint. She then commenced her trips for the season of 1808. She started regularly at the appointed hour—at first much to the discontent of travellers who had before been waited for by both sloops and stages. At the end of the season the *Clermont* was altogether too small for the crowds who thronged to take passage. Two boats, the *Car of Neptune* and the *Paragon*, were therefore soon added to the line.

"Fulton, menaced by constant contestation of his rights, took out a patent in 1809 from the General Government, and another, for improvements, in 1811. His system was so simple—the adaptation of paddle-wheels to the axle of the crank of Watt's engine—that it seemed then, as it has proved since, almost impossible by any

specifications effectually to protect it. The famous Pendulum Company caused Fulton for a time much trouble. They built a boat, the wheels of which were to be moved by a pendulum. While she was upon the stocks and the wheels were resisted only by the air, the labor of a few men made them turn regularly and rapidly; but when she was launched, and the pendulum encountered the resistance of the water, neither pendulum, wheels, nor boat would stir. The Pendulum Company were aghast at this phenomenon, and clearly saw that if the boat was to be moved by the wheels, and the wheels by the pendulum, something must be devised of sufficient power to move the pendulum. There was nothing, evidently, but the steam engine; and so they copied Fulton's. Lawsuits followed; and in his argument in behalf of Fulton Mr. Emmet thus spoke of the Pendulum gentlemen: 'They are men who never waste health and life in midnight vigils and painful study; who never dream of science in the broken slumbers of an exhausted mind; who bestow upon the construction of a steamboat just as much mathematical calculation and philosophical research as on the purchase of a sack of wheat or a barrel of ashes.' Fulton gained his cause, and the boat which was to go by clock-work was prohibited from going even by steam.

In 1812, Fulton built the *Fire-Fly;* and, as the town of Newburg, half-way to Albany, offered sufficient traffic to support at least one boat, she was placed upon that

route. In the same year he constructed two ferry-boats for crossing the Hudson, making them with rudder and bow at either end. He also contrived floating docks for their reception, and a method of stopping them without concussion. In 1813, he built a steam-vessel of four hundred tons and unusual strength, to ply in Long Island Sound between New York and New Haven. She was the first steamboat constructed with a round bottom. We quote a passage referring to her from a work published in 1817: 'During a great part of her route she would be as much exposed as she could be on the ocean: it was therefore necessary to make her a perfect sea-boat. She passes daily, and at all times of the tide, the dangerous strait of Hell-Gate, where for the distance of nearly a mile she often encounters a current running at the rate of at least six miles an hour. For some distance she has within a few yards of her, on each side, rocks and whirlpools which rival Scylla and Charybdis even as they are poetically described. This passage, previously to its being navigated by this vessel, was always supposed to be impassable except at certain stages of the tide; and many a shipwreck has been occasioned by a small mistake in the time. The boat passing through these whirlpools with rapidity, while the angry waters are foaming against her bows and appear to raise themselves in obstinate resistance to her passage, is a proud triumph of human ingenuity. The owners, as the highest tribute they

had in their power to offer to his genius, and as an evidence of the gratitude they owed him, called her the *Fulton*.

"Early in 1814, the United States and England being at war, Fulton conceived the idea of a steam vessel-of-war, capable of carrying a strong battery, with furnaces for redhot shot, and sailing four miles an hour. Congress authorized the construction of such a floating battery, and the keel was laid on the 18th of June. The vessel was launched on the 27th of October the same year, in the midst of excited and applauding throngs. Before she sailed, however, her engineer and builder had been removed to another sphere: Fulton died on the 24th of February, 1815. The Legislature paid an unusual tribute to his memory: they resolved to wear mourning for three weeks. This manifestation of regret for the loss of a man who had never held office nor served his country in any public capacity, was entirely unprecedented.

"On the 4th of July, the steam frigate made a trial trip, and, with her engines alone, sailed fifty-three miles in eight hours and twenty minutes. The following description of the *Fulton* the *First*, as she was called, is given by the committee appointed to examine her in behalf of Congress: 'She is a structure resting on two boats and keels separated from end to end by a channel fifteen feet wide and sixty-six feet long. One boat con-

tains the caldrons of copper to prepare her steam; the cylinder of iron, its piston, lever, and wheels, occupy part of the other. The water-wheel revolves in the space between them. The main or gun deck supports the armament, and is protected by a parapet, four feet ten inches thick, of solid timber, pierced by embrasures. Through thirty portholes as many thirty-two pounders are intended to fire redhot shot, which can be heated with great safety and convenience. Her upper or spar deck, upon which several thousand men might parade, is encompassed by a bulwark, which affords safe quarters : she is rigged with two stout masts, each of which supports a large lateen yard and sails : she has two bowsprits and jibs, and four rudders, one at each extremity of each boat, so that she can be steered with either end foremost : her machinery is calculated for the addition of an engine which will discharge an immense column of water, which it is intended to throw upon the decks and through the portholes of an enemy, and thereby deluge her armament and ammunition. If in addition to all this we suppose her to be furnished, according to Mr. Fulton's intention, with hundred-pound Columbiads, two suspended from each bow so as to discharge a ball of that size into an enemy's ship ten or twelve feet below her water-line, it must be allowed that she has the appearance, at least, of being the most formidable engine for warfare that human ingenuity has contrived.'

"Such was the first step toward the establishment of a steam-navy. Forty years afterwards, George Steers built the propeller-frigate Niagara; and the reader, by comparing the two vessels, will have an adequate idea of the immense strides made in naval mechanics and engineering during the lapse of less than half a century. In Europe the size and qualities of the *Fulton* the *First* were at the time ludicrously exaggerated, as will be seen from the following passage from a Scotch treatise on steamships. After magnifying her proportions threefold, the author continues: 'The thickness of her sides is thirteen feet of alternate oak plank and cork wood: she carries forty-four guns, four of which are hundred-pounders; quarter-deck and forecastle guns, forty-four pounders: and, further to annoy an enemy attempting to board, can discharge one hundred gallons of boiling water in a minute, and, by mechanism, brandishes three hundred cutlasses with the utmost regularity over her gunwales, works also an equal number of heavy iron spikes of great length, darting them from her sides with prodigious force and withdrawing them every quarter of a minute!'"

We cannot look into the future of our country on land or on the sea; but whatever progress in naval affairs we may make, it is quite certain that some of Captain Ericsson's inventions will never be essentially improved, nor supplanted by other creations of genius. The propeller is preëminent among them.

It is not improbable that he will yet so perfect the Monitors, that for warfare and defence they will have no rivals while the ocean is darkened with the smoke of battle.

While you read of the vast armies and great battles of the present war, you may have forgotten, if you ever read in ancient history, what immense armies met in battle on land and sea centuries ago, and how they fought.

Sennacherib, the Bible tells us, lost in a single night 185,000 men by the destroying angel.

The city of Thebes had a hundred gates, and could send out at each gate 10,000 fighting men and 200 chariots—in all 1,000,000 men and 20,000 chariots.

The army of Terrah, king of Ethiopia, consisted of 1,000,000 men and 300 chariots of war.

Sesostris, king of Egypt, led against his enemies 600,000 men, 24,000 cavalry, and 27 scythe-armed chariots—1491 B. C.

Hamilcar went from Carthage and landed near Palermo. He had a fleet of 2,000 ships and 3,000 small vessels, and a land force of 200,000 men. At the battle at which he was defeated 150,000 were slain.

Ninus, the Assyrian king, about 2,200 years B. C., led against the Bactrians an army of 1,700,000 horses, and 6,000 chariots armed with scythes.

Semiramis employed 2,000,000 men in building Baby-

lon. She took 105,000 prisoners at the Indus, and sank 1,000 boats.

A short time after the taking of Babylon, the forces of Cyprus consisted of 600,000 foot and 120,000 horses, and 2,000 chariots armed with scythes.

An army of Cambyses, 50,000 strong, was buried up in the desert sands of Africa, by the south wind.

When Xerxes arrived at Thermopylæ, his land and sea forces amounted to 2,614,610, exclusive of servants, eunuchs, women, sutlers, &c., in all numbering 5,282,220. So say Herodotus, Plutarch, and Isocrates.

The army of Artaxerxes, before the battle of Conoxa, amounted to 1,200,000. 10,000 horses and 100,000 foot fell in the fatal field of Issus.

When Jerusalem was taken by Titus, 1,000,000 men perished in various ways.

The army of Tamerlane is said to have amounted to 1,600,000, and that of his antagonist, Bajazet, to 1,000,000.

But the navies referred to were rude enough compared with our large, beautiful, and formidable ships of war. And no powder-smoke covered the contending hosts — no shells screamed through the air, scattering human limbs on every side.

Oh! we should devoutly hope and pray that the religion of the Cross may soon banish these scenes from the earth, and furnish peaceful employment only to genius

like that of Ericsson—covering our seas with the white wings of ships bearing messengers of GOD'S love and mercy, and the products of climes under the sceptre of a King, whose reign is the highest, purest freedom for mankind. Then will the "mournful numbers" of the following touching lament no more be heard in our land:

A MOTHER'S STORY.

BY EUGENE H. MUNDAY.

Amid the throng that gathers where
The mail dispenses joy and care,
I saw a woeful woman stand—
A letter falling from her hand:
She spoke no word, she breathed no sigh;
Her bloodless cheek, her sad, fixed eye,
And pallid, quivering lips apart,
Showed hopeless grief had seized her heart.
I spoke; a word of kindness cheers
The heavy heart, and heaven-sent tears
Refresh the eye dry sorrow sears.

"Ah! sir, my boy! my brave, bright boy!"
In broken voice, she said;
"My only son! my only joy!
My brave, bright boy is dead!"

"Sorrow is sacred!" and the eye
That looks on grief is seldom dry:
I listened to her piteous moan,
Then followed to her dwelling lone,

Where, sheltered from the biting cold,
She thus her simple story told:

"My grandfather, sir, for freedom died.
On Eutaw's bloody plain;
My father left his youthful bride,
And fell at Lundy's Lane.

"And when my boy, with burning brow,
Told of the nation's shame—
How Sumter fell—oh! how, sir, how
Could blood like mine be tame!

"I blessed him; and I bade him go—
Bade him *our* honor keep;
He proudly went to meet the foe;
Left me to pray and weep.

"In camp—on march—of picket round—
He did his equal share;
And still the call to battle found
My brave boy always there.

"And when the fleet was all prepared
To sail upon the main,
He all his comrades' feelings shared—
But fever scorched his brain!

"He told the general he would ne'er
From toil or danger shrink,
But, though the waves he did not fear,
It chilled his heart to think

"How drear the flowerless grave must be,
Beneath the ocean's foam,
And that he knew 'twould comfort me
To have him die at home.

"They tell me that the general's eye
With tears did overflow:
GOD BLESS THE BRAVE MAN! with a sigh
He gave him leave to go.

"Quick down the vessel's side came he;
Joy seemed to kill his pain;
'Comrades!' he cried, 'I yet shall see
My mother's face again!'

"The boat came bounding o'er the tide;
He sprang upon the strand;
God's will be done! my bright boy died,
His furlough in his hand!"

Ye, who this artless story read,
If Pity in your bosoms plead—
And "Heaven has blessed your store"—
If broken-hearted woman meek,
Can win your sympathy—go, seek
That childless widow's door!

THE END.

his

33
V 7490 ①
LRB Ap '26

LIBRARY OF CONGRESS
0 030 013 012 4